NEWSCASTER VT2

ENG/OB Microwave Transmitter

User Manual

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For NCVT2 Rev B (*Software Version B1p6*)

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Customer Service technicians at Nucomm are available to extend technical assistance to customers installing or operating Nucomm equipment. They will also assist customers with equipment troubleshooting. If this cannot be successfully accomplished by telephone, the equipment may be returned to the factory for repair. Loaner equipment is often available until Nucomm is able to ship repaired units.

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- RA number.
- Model number.
- Serial number.
- Frequency operating range (*in the case of modules*).
- A detailed description of the problem.
- Name of an engineer or technician we may contact in regards to this problem.
- Include a "ship to" and "bill to" address.

Ship to:

Nucomm, Inc.
101 Bilby Road
Hackettstown, New Jersey 07840

For International orders

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Telephone Consultation

Should there be a need for emergency telephone consultation, please have your model number and serial number available for the Customer Service representative. Nucomm Customer Service representatives are available to deal with all technical questions or difficulties.

Replacement Modules

Troubleshooting to the component level is often not cost-effective and frequently impossible. Often the practical method of effecting field repairs is to substitute known good spare modules for suspect units. Nucomm maintains an inventory of replacement modules for its standard line of products.

Field Repair

Nucomm products are designed with easy access to components to facilitate service. When troubleshooting the VT2 Transmitter, the user is cautioned to read all module descriptions in this manual. Some Nucomm modules cannot be serviced in the field. Warnings are included in the circuit descriptions and on certain modules themselves, however; the lack of a warning cannot be construed as a statement of safety. To prevent voiding of the Nucomm warranty that protects the equipment, please contact Nucomm before servicing or making any repairs.

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Equipment shipped FOB Nucomm, Inc.; shall become the property of buyer upon delivery to and receipt from carrier. Any damage in shipment should be handled by the buyer directly with the carrier. Immediately request the carrier's inspection upon evidence of damage in shipment.

Do not return any Nucomm product to the factory until a return authorization (RA) number has been given, along with shipping instructions, as discussed previously.

Contact Information

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24-Hour Hotline:
US: .....(888) 531-3892
International: .....001 - 1 - (888) 531-3892

CAUTION!

RISK OF ELECTRICAL SHOCK. DO NOT REMOVE COVERS.

- Do not remove any covers.
- Refer servicing to qualified technicians only.
- Disconnect all power before servicing.
- Read and perform all instructions carefully. Failure to follow suggested instructions and guidelines may void all warranties.

FCC STATEMENT

This equipment has been tested and found to comply with Part 74.637 (a) (2) of the FCC Rules and Regulations. Any unauthorized changes or modifications not expressly approved by Nucomm, Inc. could void the user's authority to operate the equipment, and invalidate the equipment's warranty.

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Document Revision

Date Modified	Revision	Modified by	Modification Detail
October 10, 2006	0.0 0.1	R.Risch / M Hardy Mike Hardy	Initial release Updated screens and functions per s/w B1pG. - modulation display on default screen - set tone level on color bars - change "preset change" to "save preset" - limiting PAL video filter choices to 5.6 or bypass

1. DESCRIPTION

Nucomm's NewsCaster VT2 series is a two box Digital and Analog ENG/OB Microwave Transmitter System. The Mast Mounted Microwave Transmitter is designed to operate in any specified band in the 1.00 GHz to 15.5 GHz frequency range. Each unit is field programmable and configurable to meet a wide range of customer requirements.

The NewsCaster VT2 is a "split-box" transmitter system, utilizing a rack-mounted Control Unit (*19" x 1RU, sometimes referred to as the "IDU"*), and a Mast Mounted transmitter RF Head (*or "ODU"*). The two are connected with a single IF cable (*RG-6 coax, or optional Triax*), which carries the 70 MHz IF, Control Data, and DC power. For cases where an existing IF cable in the Nycoil must be used, and cannot support the diplexing of the DC power, the NewsCaster VT2 can be fitted with an AUX Power output to send the power via separate conductors.

The NewsCaster VT2 is fully integrated with an Analog FM modulator, compliant super-low delay MPEG 2 Encoder and Multimode Digital Modulator. Available modulations include FM (*NTSC / PAL*), COFDM, ***optional*** single carrier QAM, and ***optional*** VSB. As additional digital modulation formats become available, the VT2 can easily be software updated. This makes the VT2 *Rev B* extremely flexible while greatly reducing circuit complexity.

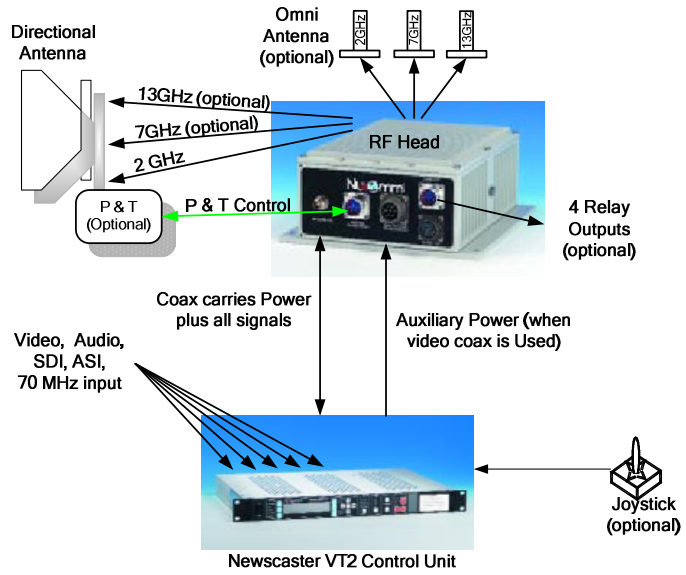


Figure 1: NewsCaster VT2 System Diagram

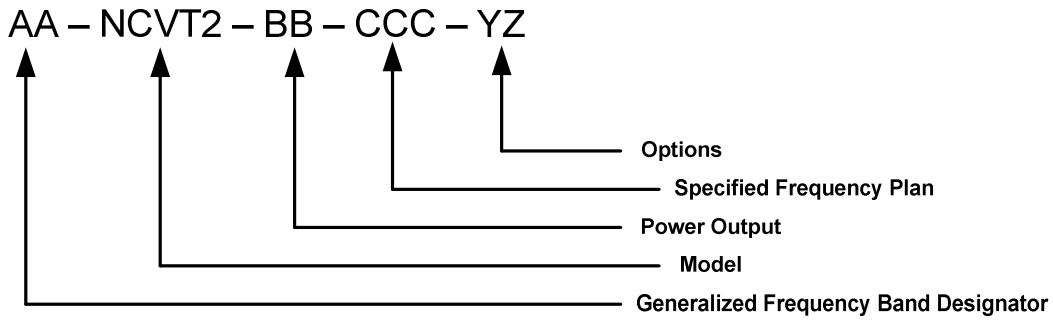
Highlighted features include: six "Quick-Key" presets that allow single button operation, integrated dynamic color bars, and HD transport capability. Also, special menus have been included to ease the BAS relocation process.

Other available options for the NewsCaster VT2 include Pan & Tilt control, a 10 Watt Digital High Power Amplifier, remote control and monitoring functionality, multi-band operation, etc.

This manual is written in a general form to cover all configurations and options for the NewsCaster VT2 within the 1.00 GHz to 15.5 GHz frequency range.

The convention of this manual is to show non-standard configuration options with shaded text, as shown here.

The parts lists and drawings in this manual are specific to this unit.



Where as:

AA = mean frequency band centered in GHz, rounded to the closest GHz. This number is then multiplied by 10. For multiple bands, each center frequency designation is separated by a backslash (/).

BB = Used to identify the power output, per the following Power Output Designators:

Power Output is represented by Letters (A-Z; A=1, B=2, C=3, etc) for the analog power, and Numbers (0-9) for the digital power. For example, a 5W Analog / 2W digital system would be described with a power indicator of "E2". A Dual-Band system would have two sets of power indicators, to show the power levels at both bands.

CC = Nucomm assigns a frequency chart number for each unique frequency channel combination. Contact your Nucomm representative for further information.

X = Type Emphasis; 1 = NTSC and PAL M; 2 = PAL B/G

YZ = Miscellaneous options as listed below (append as many letters as needed)

G = 160 VDC Pan & Tilt	M = FM only
G1 = 12 VDC Pan & Tilt	M1 = COFDM only
I = Four Contact Closures	M2 = FM / COFDM
J = NSI Antenna	M3 = FM / COFDM / DVBS
K = Radio Waves Antenna	M4 = COFDM / DVBS
U1 = 90 to 260 VAC	M5 = DVBS only
U3 = 11 to 15 VDC	M6 = External 70MHz

Options that are not a standard part of the system, will be shown by shaded text as shown here.

2. FEATURES

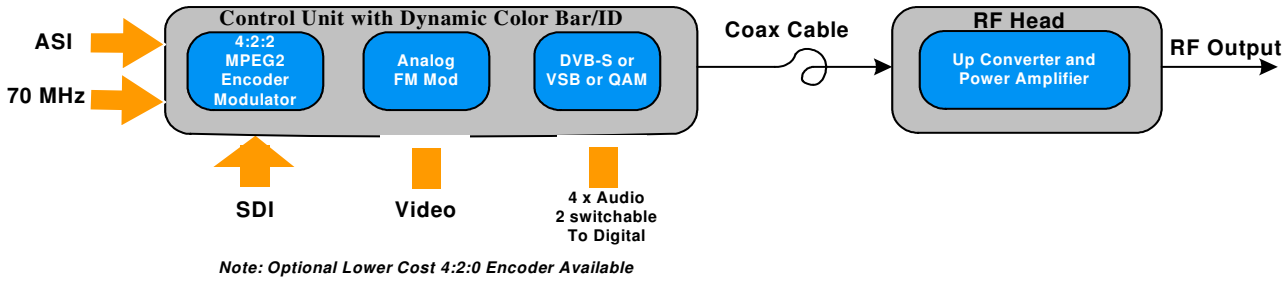


Figure 2: NewsCaster VT2, Simple Block Diagram

Nucomm's NewsCaster VT2 Series Digital-Analog ENG/OB microwave transmitter was designed with the 2 GHz BAS Relocation in mind, and is optimized for ENG/OB truck applications. Nucomm has led the way in creating the most comprehensive ENG/OB transmitter available, with many state-of-the-art features not found in any of the other competing models.

Control Unit Features:

Fully integrated features of the Control Unit (as shown in Figure 3) include:

- Smart LCD Display for system control
- Six Quick-Key presets that allow single button configuration
- Integrated dynamic color bars, with tone
- Super low delay MPEG-2 using a 4:2:2 or 4:2:0 encoder
- Multi-Mode modulator that includes COFDM, Analog FM (and optional VSB, DVB-S or QAM) modulation
- High data rate HD transport
- Special menus to ease the BAS relocation process (U.S. only)
- Antenna polarization selection (CW, CCW, H, V)
- Omni/Directional antenna selection (Optional)
- Control of four Form C Relay Closures in the RF Head (Optional)
- Integrated Pan / Tilt Control (Optional)
- Joystick for Pan / Tilt (Optional)

Digital & Analog Input Signals:

The NEWSCASTER VT2 Control Unit accepts multiple input formats. These include:

- Composite video (NTSC & PAL)
- Digital video as SDI, with audio de-embedding
- ASI
- Two analog audio (optionally four)
- One digital AES/EBU audio (optionally two)
- 70 MHz

The audio's can be combined with the video via the MPEG-2 encoder or the FM sub-carriers. A key feature of the Newscaster VT2 is that the SDI video can be converted internally to composite video and transmitted as FM analog modulation. The Audio and Video signal flow is shown in Figure 3.

In Digital mode, the NewsCaster VT2 accepts video as SDI, ASI, or Composite, along with LINE, Embedded, or AES audio(s), and digitally compresses the signals using 4:2:2 or 4:2:0 MPEG-2 encoding. The encoded signal is then internally modulated with one of the user-selected formats: COFDM, or ***optional*** QAM or VSB. (Refer to Figure 3).

For additional flexibility, an ASI Out port is provided, enabling the NewsCaster VT2 to be used as a standalone ASI Encoder

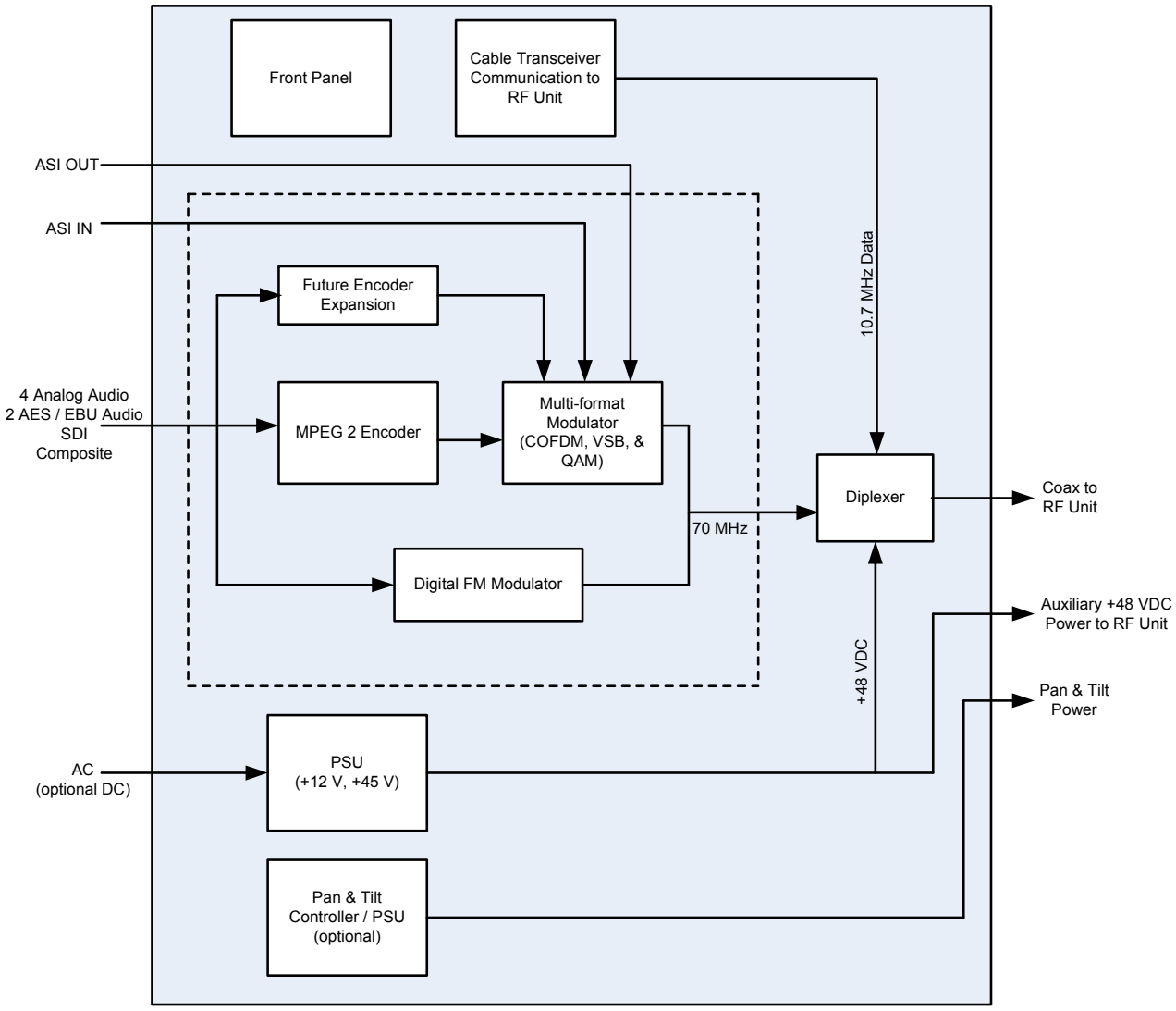


Figure 3: Control Unit Block Diagram

In Analog mode, the NewsCaster VT2 accepts SDI or Composite video, and LINE, Embedded, or AES audio.

The NewsCaster VT2 can also accept externally modulated signals via the 70 MHz Input Port.

NTSC / PAL Video Filters:

When in NTSC mode, the following video filter selections are available: 3.90, 4.50, 4.75, 5.60MHz, and "bypass". In PAL mode, the NewsCaster VT2 limits the video filter selections to 5.60MHz and "bypass".

Audio Sub-carriers:

The two standard (*or four optional*) synthesized audio sub-carriers are field programmable and feature individual source selection (*OFF / LINE / TONE / AES*) and gain control via the menu system or audio "Quick-Key". The sub-carrier frequencies, mode, and additional gain are front panel adjustable using the menu system.

Prime Power:

The standard Control Unit input voltage is 90 to 240 volts AC (*40 to 60 Hz*). Optionally, the system can be configured for DC ranging from +11 to +32 VDC, or for both AC & DC operation in the ranges listed above. In all configurations, the system automatically adapts to the input voltage without requiring the user to change any jumpers, switches or settings. Appropriate line cords are provided.

Frequency Coverage:

Nucomm's NewsCaster VT2 transmitters are available in single-, dual-, and tri-band configurations. This manual covers all the models in the NewsCaster VT2 series.

The NewsCaster VT2 series radios provide full coverage of the 2, 7 & 13 GHz US frequency bands, and/or other bands as required internationally, from 1 GHz to 15.5 GHz. Band and channel selections are made and clearly displayed via the front panel LCD interface.

Mode Selection:

The Operating Mode is accessed from the front panel under the grouping labeled "MODE". There are several options or functions that can be selected.

Normal Mode: In the "NORMAL" mode, the NewsCaster VT2 amplifiers are powered and transmitting.

Standby Mode: In the "STANDBY" mode, the transmitter is powered on, but the RF output is muted, enabling the transmitter to be tuned safely without radiating off-frequency emissions. The NewsCaster VT2 will remain in "STANDBY" until on-frequency lock has been obtained. Switching from "STANDBY" to the "NORMAL" (*operating*) mode results in instantaneous on-frequency transmission. If the synthesizer has not attained lock when Standby Mode is switched to "NORMAL", the unit will remain in STANDBY" until on-frequency lock has been obtained.

Video Presence Standby: When Analog power mode is selected, the unit may be placed in "V.Pres Stby" (Video Presence Remote) mode. When in this mode, the unit transmitter will be in the "Normal" transmitting mode as long as the video source is connected to the Video or SDI input. When the video is removed, the transmitter will go to "STANDBY" within five seconds. Reapplying the video will immediately turn the transmitter back ON. The Video Presence Remote Standby mode enables the camera operator to remotely place the transmitter in standby or turn it ON.

Dynamic Color Bar Generator:

To activate the Dynamic Color Bar Generator, press the "TEST GEN" button on the front panel of the Control Unit. The LED above the button will light. The color bar pattern is the SMPTE color bar standard.

In the middle of the pattern is a 16 character ID that can be programmed through the LCD display. The first character in the ID will blink to indicate that the microwave link is active. (*In a digital system if the decoder stops decoding, the picture will freeze and the operator would have no way of knowing this without the blinking character title*.)

In addition to numbers and characters, several symbols are available for display in the ID. These symbols include a helicopter, a Van, a camera, etc.

When the Dynamic Color Bar Generator is activated, a 1 kHz test tone is inputted to the active audio channels. The left channel will be a solid tone. The right channel will be a pulsed tone. The tone levels can be varied from -26 to -10dBFS.

Preset Keys:

Nucomm has designed six Preset Keys into the front panel of the Newscaster VT2. These keys are used to instantly recall previously programmed configuration parameters such as frequency, modulation format, analog or digital, video and audio input type, etc.

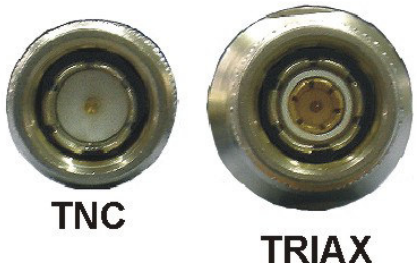
Antenna Operation:

The Newscaster VT2 can control a number of antenna functions, including:

- Polarization switching
- Directional-Omni antenna switching
- Selection between RWI or NSI Antennas

Coax Cable Requirements:

The NEWSCASTER VT2 Control Unit and RF Head are typically connected with a single Coax or Triax cable. This cable carries the 70 MHz IF and the Control Data signals—and in a typical system, carries the power to the RF Head, which is diplexed onto the center conductor of the cable for coax, or through the inner shield when Triax is used. The cable conductor must carry 2 to 3 amps of current at +48 volts.
The center conductor of Belden 1694A/RG 6U coax (or equivalent), and the inner shield of the Belden 8232A/RG59U triax are large enough to carry this current with a minimum of voltage drop.



When using video cable such as RG 58, or Belden 1505/RG-59U, the voltage drop through the center conductor is too great to carry the diplexed +48 volts. To support the use of these cables—which may be existing in the Nycoil and must be used—Nucomm has provided an auxiliary power ("AUX Power") connector that routes the power to external wires. Refer to Section 4.7 for details.

The standard coax cable required between the Control Unit and the RF Head must have an impedance of 75 Ω. The Newscaster will on occasion, be used to replace systems that use 50 Ω RF or video type coax cable in an existing Nycoil. On special request, Nucomm can configure the Newscaster VT2 system to operate using these 50 Ω cables. Again, depending on the type of coax cable used in the pre-existing Nycoil, the power to the RF Head may require the use of the AUX Power option.

RF Head Features:

The rugged NewsCaster VT2 RF Head, as shown in Figure 4, includes:

- IF to RF Up-Converter.
- RF Power Amplifier.
- Low Noise Frequency Synthesizer.
- Diplexer that splits the +48 volts, the 70 MHz and the Control Data.
- DC to DC Converter.
- Optional Pan & Tilt Controller.
- Optional Omni/Directional Antenna switch.
- Optional Four Form C Relay contacts controlled from the Control Unit.

The RF Head components are housed in a weatherproof enclosure that mounts on the antenna pan and tilt housing, replacing the conventional power amplifier. This setup combines precise tuning of the transmitter frequency with exceptional output power. The RF unit is equipped with type "N" connectors for the directional and ***optional*** omni-directional antenna(s).

Other Standard Features:

- Digitally synthesized microwave oscillator tuning.
- RS232/RS485 Remote.
- RF Power Output Adjustments.
- Field Programmable RF and ASC settings.

Other Options:

- Remote Control Software allowing the NewsCaster VT2 to be fully monitored and controlled from an IBM Compatible PC through a RS232C/RS485 port.
- Mounting Adapter Plates enabling mounting of the RF Head to the Pan and Tilt.

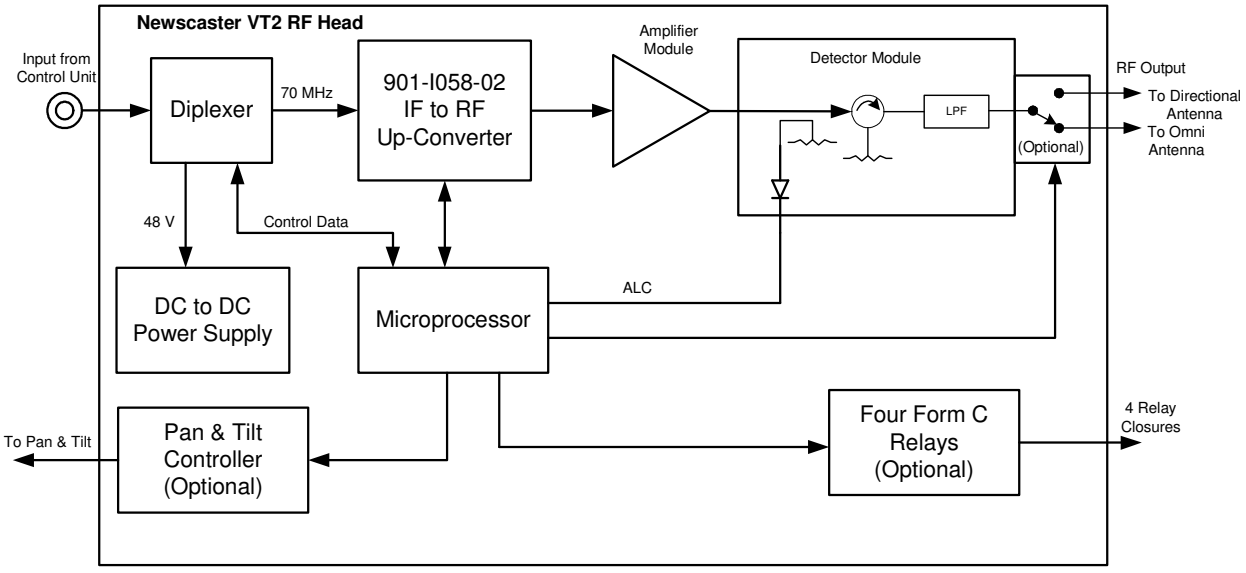


Figure 4: RF Head Block Diagram

3. SPECIFICATIONS AND FREQUENCY PLANS (USA)

RF PERFORMANCE

Frequency Bands (*Front panel selectable*)
Band 1: .....1.99 GHz – 2.50 GHz
Band 1 (*optional*): .....2.30 GHz – 2.70 GHz
Band 2: .....6.43 GHz – 7.12 GHz
Band 3: .....12.706 GHz – 13.250 GHz
(*other plans available per user requirements*)

Tuning step size: .....250 kHz (*US*), 100 kHz (*International*)
70 MHz input: .....–10 dBm to 0 dBm (*75 Ohms*)
Frequency stability: .....± 5ppm (*.0005%*)

Power Output:

2 GHz band:
Standard: .....12 Watt Analog; 4 Watt Digital
Optional: .....10 Watt Digital**

6/7 GHz band:
Standard: .....5 Watt Analog; 2 Watt Digital
Optional: .....10 Watt Analog, 4 Watt Digital
Optional: .....10 Watt Digital**

Dual Band 2 + 7 GHz:
Standard: .....2 GHz: 12 Watt Analog, 4 Watt Digital
Standard: .....7 GHz: 5 Watt Analog, 2.5 Watt Digital
Optional: .....10 Watt Analog; 2.5 Watt Digital;
Optional: .....10 Watt Digital**

13 GHz Band
Standard: .....1 Watt Analog, 0.25 Watt Digital
Optional: .....3 Watt Analog, 1.75 Watt Digital

**Analog adjustable to FCC maximum EIRP (*max amp power 25 Watt*);

Standby mode:
Standby: .....No RF output
Normal: .....Instant on frequency transmission

NEWSCASTER VT2 Specifications (*continued*)

Modulation Modes

COFDM

Modulation Formats:.....COFDM; QPSK, 16QAM, 64 QAM
Code Rate:.....1/2, 2/3, 3/4, 5/6, 7/8
Guard Interval:.....1/32, 1/16, 1/8, 1/4
Bandwidth:.....6 MHz, 7 MHz, and 8 MHz

Analog

Analog FM:.....2 field tunable sub-carriers (*optional 4*)
Modulation Deviation (*field selectable*): .....3 MHz/volt or 4 MHz/volt

VSB

Modulation Formats.....2VSB, 4VSB, 8VSB, 8TVSB

Video & Digital Input Performance:

Analog Video Mode:

Video:.....525/625 lines NTSC/PAL field selectable
1V p-p for ± 4 MHz deviation
1 V p-p for ± 3 MHz deviation
(*Video input sensitivity switchable*)
Pre-emphasis or Flat: .....Field selectable
Pre-emphasis:.....NTSC/PAL-B, G, or M (*field selectable*)
Video Low-Pass-Filter (*field selectable*): ..3.9, 4.5, 4.75 and 5.6MHz
Frequency Response: .....0.5 dB (*10 Hz to video filter selected*)
Base-Band Response:.....1.0 dB (*10 Hz to 10 MHz*)
Signal-to-noise ratio:.....69 dB typical (*65 dB minimum*)
Differential Phase: .....± 1.0 degrees
Differential Gain:.....± 1.0 %

Digital Video Mode:

Composite Video:
1V p-p Maximum input
Frequency Response: .....0.5 dB (*10 Hz to 20 kHz*)
Base-Band Response:.....1.0 dB (*10 Hz to 10 MHz*)
Signal-to-noise ratio:.....69 dB typical (*65 dB minimum*)
Differential Phase: .....± 0.5 degrees
Differential Gain:.....± 0.5 %
SDI and ASI.....0.80 Volts p-p

Digital and Analog Modes:

Input impedance:.....75 Ω
Return loss: .....–26 dB (*10 Hz to 5 MHz*)

NEWSCASTER VT2 Specifications (*continued*)

Audio Performance:

Analog Audio Mode

Two channels: .....2 Analog, ***or*** 1 AES/EBU, SDI De-embedded
Four optional: .....4 Analog, ***or*** 2 AES/EBU, SDI De-embedded
Sub-Carriers: selectable and field tunable from front panel; Tunable in 5 kHz steps 4.8 MHz to 9.0 MHz

Digital Audio Mode

Two channels: .....2 Analog, ***or*** 1 AES/EBU, SDI De-embedded
Four optional .....4 Analog, ***or*** 2 AES/EBU, SDI De-embedded
Frequency Response: .....30 Hz to 20 kHz: 0.5 dB

Digital & Analog Audio Line Input:

US: .....+8 dBm, 600 Ω for 75 kHz deviation
International: .....+12 dBm, 600 Ω for 100 kHz deviation

Frequency Response:

30 Hz to 10 kHz: .....0.5 dB
10 kHz to 15 kHz: .....1.0 dB

Signal-to-noise:

Line audio: .....65 dB

Deviation: .....75 kHz peak at 1 kHz (*100 kHz for PAL*)
Pre-emphasis: .....75 µs & 50 µs LCD selectable

Harmonic distortion:

Line audio: .....0.5% maximum (*typically 0.2 %*)

Remote control: .....RS-232 / RS-485

Power Requirements:

Input range: .....100 to 260 VAC, 50/60 Hz (*Optional DC:* +11 to +32)
Power consumption: .....80 W typical (*12 watt version*)
10 Watt all Digital: .....120 Watts

Environmental:

Temperature range:

Full specification (*RF Head*): .....–30° to +60°C
Full specification (*Control Unit*): .....–10° to +50°C
Storage: .....–40° to +80°C

Humidity: .....0 to 95% non-condensing

Altitude:
Operating: .....20,000ft (*6,000 m*)
Storage: .....50,000ft (*15,000 m*)

NEWSCASTER VT2 Specifications (*continued*)

Physical Characteristics:

Size:

Control Unit: .....19" (*48.26 cm*) W, 1.75" (*4.45 cm*) H, 16" (*40.64 cm*) D
RF Head (*Standard Power*): .....9.5" (*24.13 cm*) W, 5" (*12.7 cm*) H, 15" (*38.1 cm*) L
RF Head (*High Power*): .....9.5" (*24.13 cm*) W, 6.38" (*16.2 cm*) H, 15" (*38.1 cm*) L

Weight:

Control Unit: .....6 lbs (*2.72kg*)
RF Head (*Standard Power*): .....12 lbs (*5.45kg*)
RF Head (*High Power*): .....16.5 lbs (*7.425 kg*)

Connectors:

Control Unit:

Video / SDI / DVB-ASI / 70MHz: .....Type BNC-F
Audio: .....Removable Screw Terminal Strip
IF output to RF Head: .....TNC-F (*optional Triax)*
Optional AUX Power out: .....Terminal Strip
Remote Control (RS232 / RS485): .....9 Pin D, Female
Remote Control (Ethernet):.....RJ-45
Summary Alarm:.....Form C on Terminal Strip
Pan / Tilt Power (to RF Head): .....8 Pin military style connector (Refer to Sec 4 for cabling)

RF Head:

Optional AUX Power in: .....15 Pin military style connector (Refer to Sec 4 for cabling)
RF Output: .....Type "N" female
Polarization: .....12 Pin military style connector (Refer to Sec 4 for cabling)
Pan / Tilt Power (*from Control Unit*):.....7 Pin military style connector (Refer to Sec 4 for cabling)
Pan / Tilt Control (*to Pan / Tilt*): .....18 Pin military style connector (Refer to Sec 4 for cabling)

3.1 FREQUENCY PLANS (USA)

The standard US frequency plans apply to all units sold into markets covered by the FCC. Frequency plans for all systems sold into non-US markets are individualized to meet specific customer requirements and licensing restrictions, as specified at the time of purchase.

CHANNEL / FREQUENCY PLAN - CHART NO: 326 2 GHz (17 MHz) (Frequency Range 1,994 MHz – 2,497 MHz)		
Channel	**Offset**	**Receive Frequency MHz**
1	**–**	1,994.75
1	**0**	1,999.00
1	**+**	2,003.25
2	**–**	2,012.25
2	**0**	2,016.50
2	**+**	2,020.75
3	**–**	2,029.25
3	**0**	2,033.50
3	**+**	2,037.75
4	**–**	2,046. 25
4	**0**	2,050.50
4	**+**	2,054.75
5	**–**	2,063.25
5	**0**	2,067.50
5	**+**	2,071.75
6	**–**	2,080.25
6	**0**	2,084.50
6	**+**	2,088.75
7	**–**	2,097.25
7	**0**	2,101.50
7	**+**	2,105.75
8	**–**	2,454.25
8	**0**	2,458.50
8	**+**	2,462.75
9	**–**	2,471.00
9	**0**	2,475.25
9	**+**	2,479.50
10	**–**	2,487.50
10	**0**	2,491.75
10	**+**	2,496.00

Table 1: Frequency Plan (US), 2 GHz 17 MHz

CHANNEL / FREQUENCY PLAN - CHART NO: 326 2 GHz (12 MHz) (Frequency Range 2,025 MHz – 2,496 MHz)		
Channel	**Offset**	**Receive Frequency MHz**
1	**–**	2,028.50
1	**0**	2,031.50
1	**+**	2,034.50
2	**–**	2,040.50
2	**0**	2,043.50
2	**+**	2,046.50
3	**–**	2,052.50
3	**0**	2,055.50
3	**+**	2,058.50
4	**–**	2,064.50
4	**0**	2,067.50
4	**+**	2,070.50
5	**–**	2,076.50
5	**0**	2,079.50
5	**+**	2,082.50
6	**–**	2,088.50
6	**0**	2,091.50
6	**+**	2,094.50
7	**–**	2,100.50
7	**0**	2,103.50
7	**+**	2,106.50
8	**–**	2,454.25
8	**0**	2,458.50
8	**+**	2,462.75
9	**–**	2,471.00
9	**0**	2,475.25
9	**+**	2,479.50
10	**–**	2,487.50
10	**0**	2,491.75
10	**+**	2,496.00

Table 2: Frequency Plan (US), 2 GHz 12 MHz

CHANNEL / FREQUENCY PLAN - CHART NO: 326 (Frequency Range 6,431 MHz – 7,119 MHz)		
Channel	**Offset**	**Receive Frequency MHz**
1	**–**	6,881.25
1	**0**	6,887.50
1	**+**	6,893.75
2	**–**	6,906.25
2	**0**	6,912.50
2	**+**	6,918.75
3	**–**	6,931.25
3	**0**	6,937.50
3	**+**	6,943.75
4	**–**	6,956.25
4	**0**	6,962.50
4	**+**	6.993.75
5	**–**	6,981.25
5	**0**	6,987.50
5	**+**	6,993.75
6	**–**	7,006.25
6	**0**	7,012.50
6	**+**	7,018.75
7	**–**	7,031.25
7	**0**	7,037.50
7	**+**	7,043.75
8	**–**	7,056.25
8	**0**	7,062.50
8	**+**	7,068.75
9	**–**	7,081.25
9	**0**	7,087.50
9	**+**	7,093.75
10	**–**	7,106.25
10	**0**	7,112.50
10	**+**	7,118.75
11	**–**	6,431.25
11	**0**	6,437.50
11	**+**	6,443.75
12	**–**	6,456.25
12	**0**	6,462.50
12	**+**	6,468.75
13	**–**	6,481.25
13	**0**	6,487.50
13	**+**	6,493.75
14	**–**	6,506.25
14	**0**	6,512.50
14	**+**	6,518.75

Table 3: Frequency Plan (US), 7 GHz

CHANNEL / FREQUENCY PLAN - CHART NO: 10 (Frequency Range 12,706MHz - 12,950MHz)		
Channel	**Offset**	**Receive Frequency MHz**
1	**-**	12,706.25
1	**0**	12,712.50
1	**+**	12,718.75
1	**++**	12,725.00
2	**-**	12,731.25
2	**0**	12,737.50
2	**+**	12,743.75
2	**++**	12,750.00
3	**-**	12,756.25
3	**0**	12,762.50
3	**+**	12,768.75
3	**++**	12,775.00
4	**-**	12,781.25
4	**0**	12,787.50
4	**+**	12,793.75
4	**++**	12,800.00
5	**-**	12,806.25
5	**0**	12,812.50
5	**+**	12,818.75
5	**++**	12,825.00
6	**-**	12,831.25
6	**0**	12,837.50
6	**+**	12,843.75
6	**++**	12,850.00
7	**-**	12,856.25
7	**0**	12,862.50
7	**+**	12,868.75
7	**++**	12,875.00
8	**-**	12,881.25
8	**0**	12,887.50
8	**+**	12,893.75
8	**++**	12,900.00
9	**-**	12,906.25
9	**0**	12,912.50
9	**+**	12,918.75
9	**++**	12,925.00
10	**-**	12,931.25
10	**0**	12,937.50
10	**+**	12,943.75
10	**++**	12,950.00

Table 4: Frequency Plan (US), 12 GHz

CHANNEL / FREQUENCY PAN - CHART NO: 10 (Frequency Range 12,976MHz - 13,250MHz)		
Channel	**Offset**	**Receive Frequency MHz**
1	-	12,956.25
1	0	12,962.50
1	+	12,968.75
1	++	12,975.00
2	-	12,981.25
2	0	12,987.50
2	+	12,993.75
2	++	13,000.00
3	-	13,006.25
3	0	13,012.50
3	+	13,018.75
3	++	13,025.00
4	-	13,031.25
4	0	13,037.50
4	+	13,043.75
4	++	13,050.00
5	-	13,056.25
5	0	13,062.50
5	+	13,068.75
5	++	13,075.00
6	-	13,081.25
6	0	13,087.50
6	+	13,093.75
6	++	13,100.00
7	-	13,106.25
7	0	13,112.50
7	+	13,118.75
7	++	13,125.00
8	-	13,131.25
8	0	13,137.50
8	+	13,143.75
8	++	13,150.00
9	-	13,156.25
9	0	13,162.50
9	+	13,168.75
9	++	13,175.00
10	-	13,181.25
10	0	13,187.50
10	+	13,193.75
10	++	13,200.00
11	-	13,206.25
11	0	13,212.50
11	+	13,218.75
11	++	13,225.00
12	-	13,231.25
12	0	13,237.50
12	+	13,243.75
12	++	13,250.00

Table 5: Frequency Plan (US), 13 GHz

4. INSTALLATION

4.1 UNPACKING & INSPECTION

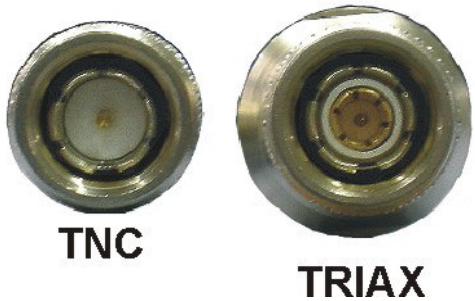
Unpack the NewsCaster VT2 and visually inspect for possible damage to the LCD, connectors, and surface areas. If damage is found, a claim should be filed with the transportation carrier. Save the shipping container and packing material for re-shipment, as needed.

4.2 PRE-INSTALLATION CHECKOUT

NOTE: *The NEWSCASTER VT2 Control Unit and RF Head conventionally are connected with either a single TNC Coax or Triax cable. In a typical system, +48 VDC is fed to the RF Head through this cable along with the 70 MHz IF and Control Data signals. However, there is a distinct different between the two types of cables. For the TNC Coax, the signals are diplexed onto the center conductor of the cable. For the Triax, the signals are diplexed on the inner shield of the cable.*

WARNING!

DO NOT connect the wrong type cable to the wrong type unit, since doing so will damage one of the connectors and result in intermittent failures.



Connect the NewsCaster VT2 IF output to the RF Head via an appropriate IF cable. (Refer to Table 7.) Connect the RF output of the RF Head through a 30 Watt, 30 dB attenuator to a spectrum analyzer and observe the output frequency on the analyzer display. Note that the frequency and level correspond directly to the LCD display on the front panel of the VT2.

NOTE: *The power level displayed on the LCD is for indication only.*

4.3 CABLES AND CONNECTORS

Detailed drawings and pin-outs of the NewsCaster VT2 cables and connectors are shown throughout this section. Please contact Nucomm Customer Service if additional detail is required.

4.4 CONTROL UNIT MECHANICAL INSTALLATION

The NewsCaster VT2 Control Unit is shipped pre-assembled. Mount the Control Unit in a standard 1RU E.I.A. rack space, using all 4 rack screws.

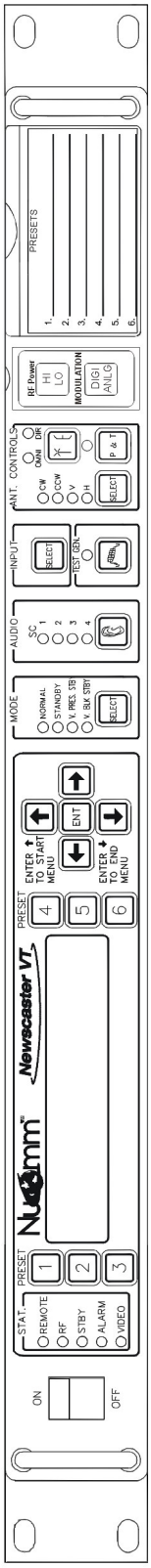
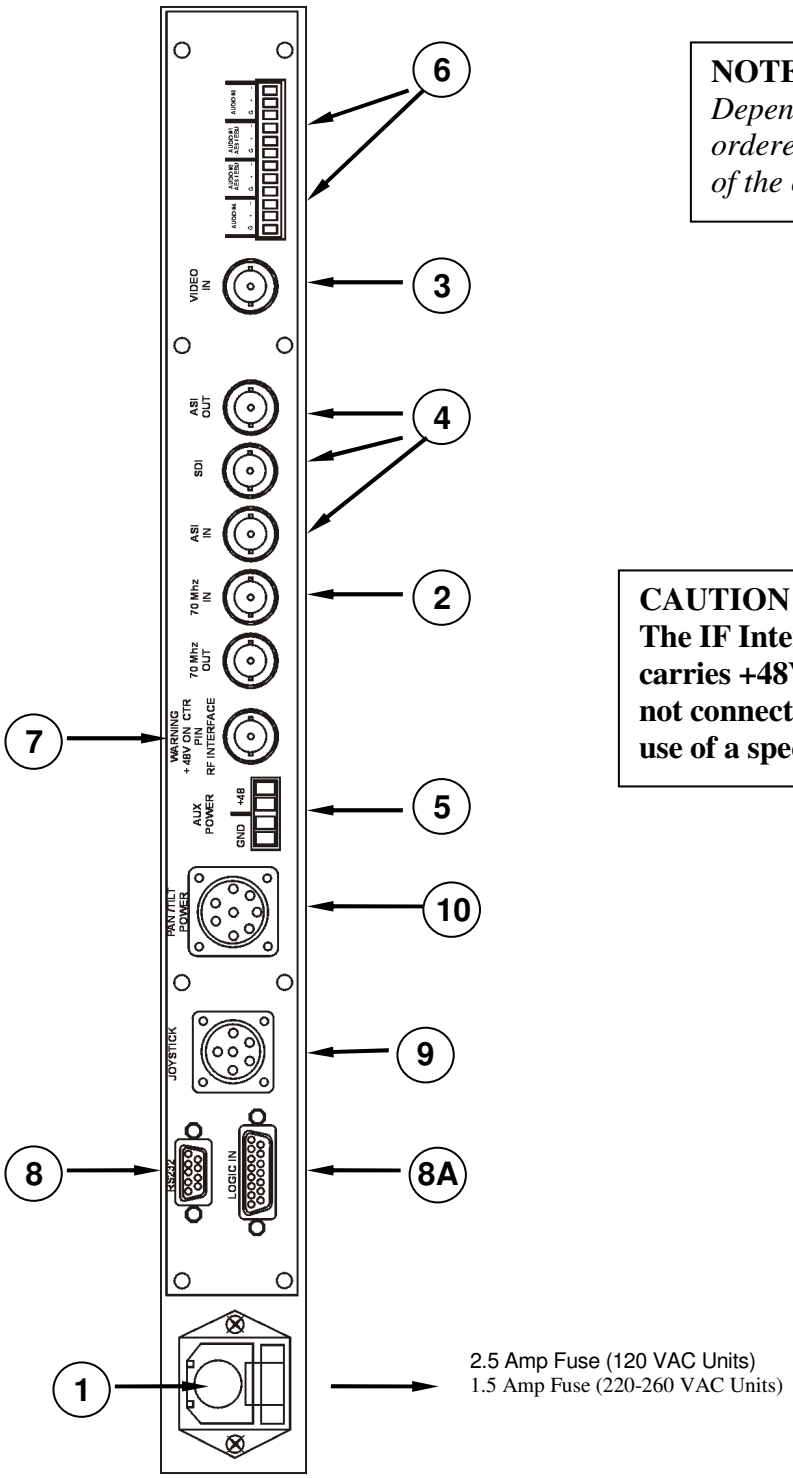


Figure 5: Control Unit Front Panel



NOTE:
Depending on the configuration ordered, some units may not feature all of the connectors pictured here.

CAUTION – IF INTERFACE (7)
The IF Interface center conductor carries +48V to power the RF Head. Do not connect any instruments without use of a special test cable.

Figure 6: Control Unit Rear Panel (AC model)

4.5 CONTROL UNIT ELECTRICAL INSTALLATION

Input Power

AC Power: The NewsCaster VT2 is standard configured to operate on AC power ranging from 90 to 260 VAC at 40 to 60 Hz. Connect the provided AC line cord to an appropriate AC power source. (Refer to Figure 6, Detail 1.) Alternate line cord connector types are available from Nucomm if needed.

DC Power: When configured for DC, the system can operate on DC power ranging from +11 to +32 VDC. Connect the provided DC line cord between the lugs on the back of the unit to an appropriate DC power source. (–) for GND, and (+) for the +11 to +32VDC.

In all configurations, the system automatically adapts to the input voltage without requiring the user to change any jumpers, switches or settings.

Video

All video inputs/outputs are made via clearly marked 75 Ω BNC connectors. (Refer to Figure 6, Detail 3 and Detail 4.) Simply connect a 75 Ω coaxial cable between the source and target equipment, and select the appropriate input type via the front panel interface. (Refer to Section 5 for details.)

Available video inputs and outputs are:

- **SDI (*Input*)** – (*Serial Digital Interface*) This signal combines both digital audio and digital video into one signal.
- **ASI IN** – (*Asynchronous Serial Interface*) Similar to SDI, this signal combines both digital audio and digital video into one signal.
- **ASI OUT** – (*from the internal encoder*) The Output ASI connector provides an output of the encoded MPEG stream, and can be used to feed a satellite modulator or external transport stream multiplexer.
- **Video (*Input*)** – It is an analog video signal that is proportional to the received signal deviation. For use with Composite and Baseband Video.

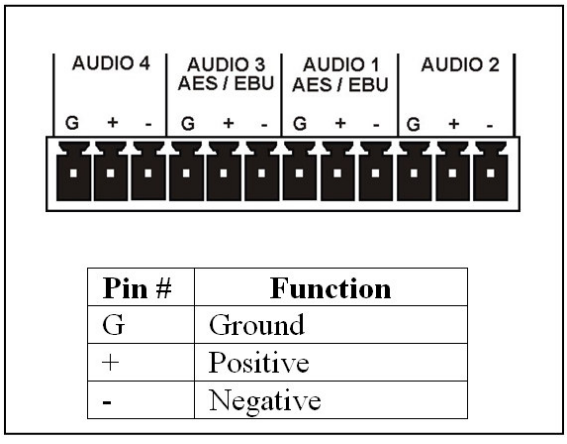
70 MHz Connectors

70 MHz input and output ports (75Ω BNC) are provided.

The 70 MHz input port allows an externally modulated signal to be inputted to the system for RF transmission. To utilize this feature, "External 70 MHz" must be selected as an input via the front panel interface. Refer to Section 5 for details.

The 70 MHz output port can be connected to a spectrum analyzer for monitoring, or to an external transmitter. (Refer to Figure 6, Detail 2).

Note: When "External 70 MHz" input is selected, the 70 MHz out is a loop-through only.



Pin #	Function
G	Ground
+	Positive
-	Negative

Figure 7: Control Unit, Audio Connector

Audio

The Analog and Digital audio inputs are made via a strip terminal on the rear panel. (Refer to Figure 6, Detail 6 for connector location.) The terminal marked "G" is for the ground lead, (–) is for the negative signal and (+) is for the positive. (Refer to Figure 7 for the connector detail.)

The Digital AES/EBU inputs are made via the Audio 1 & Audio 3 terminals. As such, only one Digital audio is available in the standard "two audio" configuration.

IF Interface and AUX Power

When the IF Cable is suitable, a single TNC (*or optional Triax*) connector (Figure 6, Detail 7) is used to output the three signals that must pass between the Control Unit and the RF Head. These are:

(a) Modulated 70 MHz signal

(b) Inter-unit control data

(c) +48VDC for the RF Head.

For cases when an existing non-conforming IF cable that cannot handle +48 VDC, the AUX Power option must be fitted on, which will provide the +48V on a separate connector (Figure 6, Detail 5) for transport to the RF Head via dedicated conductors.

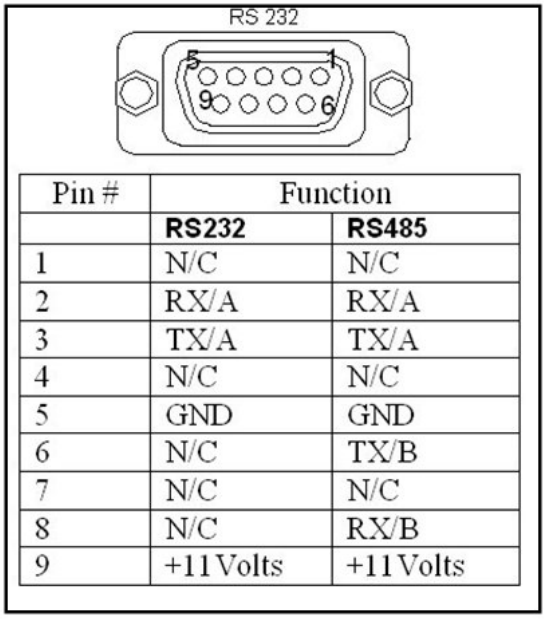
Table 7 lists conforming cables and details the various configurations possible with and without the AUX Power option.

NOTE: *When AUX Power is configured, the +48 VDC still remains available at the IF Interface port. This allows the user to upgrade to a conforming IF cable without requiring any changes to the unit.*

Additional detailed information on the interconnection between the Control Unit and RF Head is found in Sections 4.7 – 4.9.

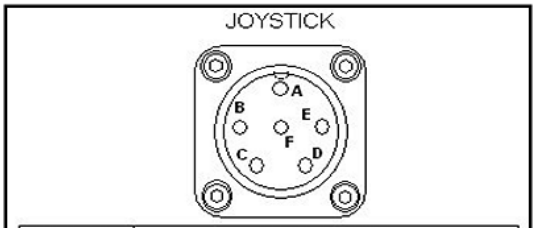
Remote

The remote control port (Figure 6, Detail 8) allows for full control and monitoring of the NewsCaster VT2. Both RS232 and RS485 are supported. Refer to Figure 8 for pin-out.



Pin #	Function	
	RS232	**RS485**
1	N/C	N/C
2	RX/A	RX/A
3	TX/A	TX/A
4	N/C	N/C
5	GND	GND
6	N/C	TX/B
7	N/C	N/C
8	N/C	RX/B
9	+11Volts	+11Volts

Figure 8: Control Unit, RS-232 Connector



Pin #	Function
A	+5V
B	Azimuth
C	Elevation
D	GND
E	Joystick Button (Not Used)
F	GND

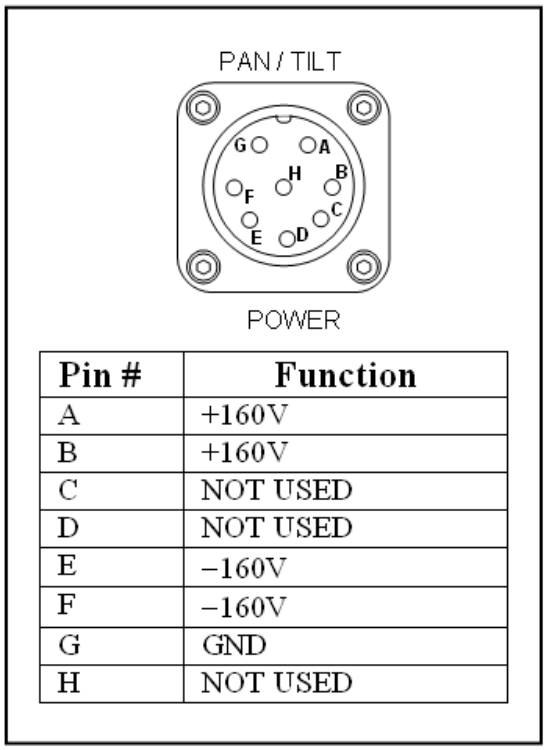
Figure 9: Control Unit, Joystick Connector

Joystick

This *optional* 6-pin connector (Figure 6, Detail 9) connects the optional joystick for Pan & Tilt Motor control. (Refer to Figure 9 for a detailed view and the pin-outs.)

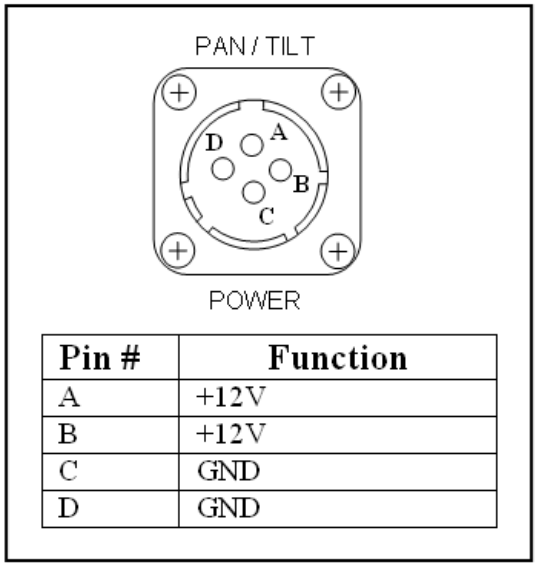
Pan/Tilt Pwr

This *optional* connector is used to provide power to the Pan & Tilt Motor. See Figure 6, Detail 10 for connector location on the Control Unit. Detailed cabling info for 120 VAC Pan & Tilt systems can be found in Table 9 and Figure 16. Detailed cabling info for 12 VDC Pan & Tilt systems is found in Table 10 and Figure 17.



Pin #	Function
A	+160V
B	+160V
C	NOT USED
D	NOT USED
E	−160V
F	−160V
G	GND
H	NOT USED

Figure 10: Control Unit, 160v Pan/Tilt Power Connector



Pin #	Function
A	+12V
B	+12V
C	GND
D	GND

Figure 11: Control Unit, 12 VDC Pan/Tilt Power Connector

4.6 RF HEAD MECHANICAL INSTALL

Nucomm's mast mounted transmitter consists of a single RF head (containing the up-converter, P&T, PSU, Antenna Controls, and amplifier

In a typical installation of Nucomm's NewsCaster VT2, the RF Head is mounted on the Pan & Tilt mechanism, which is attached to a pneumatic mast atop an ENG/OB van. (See Figure 12 for a typical mounting setup.)

To ease the mounting of the RF Head to the Pan & Tilt, mounting adapter plates are available. The plate is first mounted to the Pan & Tilt with (4) 1/4-20x.750" flat head screws, then the RF Head are mounted to the adapter plate(s). For cases when the mounting adapter plate is not used, the hole pattern of the RF Head base plate has been provided in Figure 13.

NOTE: The RF Head should be mounted so that the heat sink fins are vertical during operation.

Note: *Attach Mounting Plate(s) to Pan & Tilt before attaching to RF Head.*

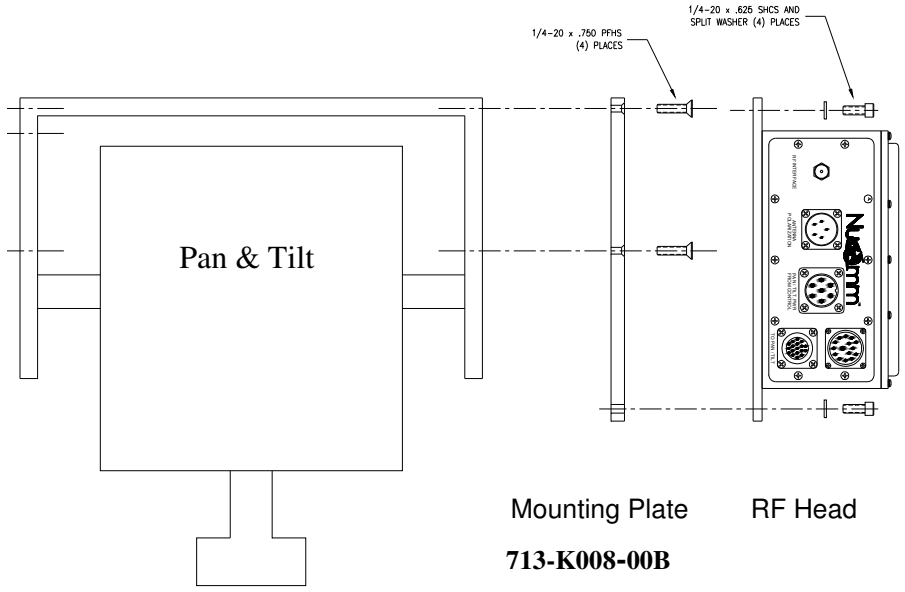


Figure 12: Mounting RF Head using Mounting Plate

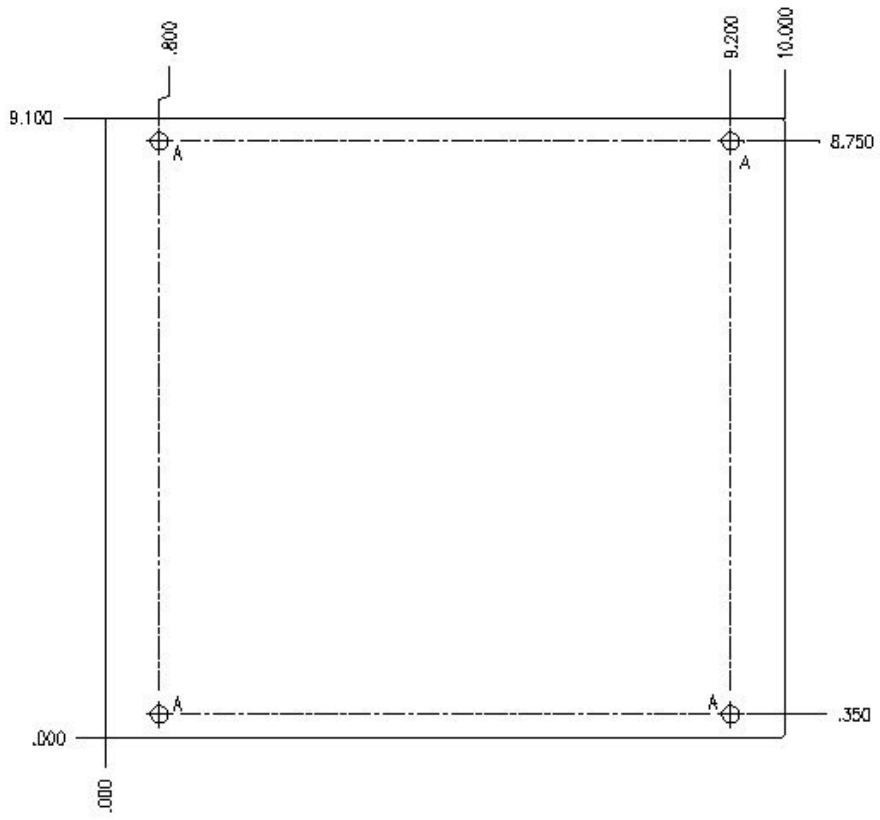


Figure 13: Hole Pattern of RF Head Base Plate

Drill holes (A) are .250 Dia. (through drilled)
Material is ALUM 6061, ¼" thick.
Use four (4) size ¼-20 x .750" screws to mount the unit.

4.7 PREPARING THE INTERCONNECT CABLES (INCLUDING NYCOIL)

The NewsCaster VT2 is flexibly designed for use with multiple IF cable types. The STANDARD cable types support diplexed +48 VDC for transport to the RF Head. Belden 1694A (*Coax*) and Belden 8232A (*Triax*) are certified for this "one cable" configuration. Other common cables, such as Belden 1505, may require the use of the AUX Power option. Refer to Table 7 for more details on using the cables types mentioned. Table 8 details the AUX Power cable.

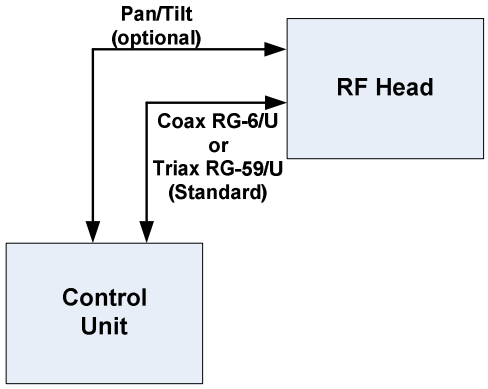


Figure 14: Nycoil Block Diagram – Standard Coax (*or Triax*) Configuration

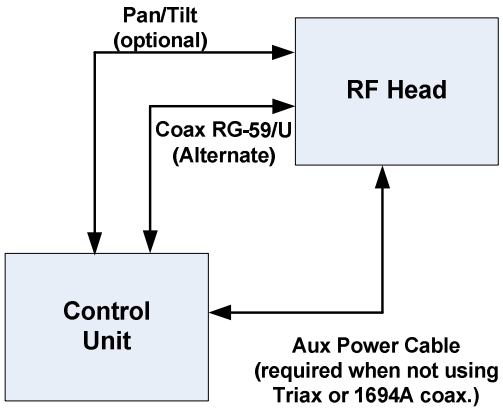


Figure 15: Nycoil Block Diagram – Alternate Coax Configuration

Most broadcasters use a Nycoil cable conduit between the truck and the mast top. The required length of the Nycoil cable is twice the difference between the extended and nested mast height.

MAST MODEL	NYCOIL LENGTH
5-20	30'
6-27	40'
7-30	50'
7-34	60'
7-42	70'
8.5-52	100'
9-58	100'

Table 6: Recommended Nycoil cable lengths

Config Type	Control Unit Connector	Cable Type	# of Conductors	Cable Use	RF Head Connector
Standard Coax (w/o P&T)	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000	Belden 1694A RG-6U (*recommended*)	N/A	• 70 MHz IF • Inter-Unit Data • +48 VDC Power	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000
Standard Coax (w/ P&T	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000	Belden 1694A RG-6U (*recommended*)	N/A	• 70 MHz IF • Inter-Unit Data • +48 VDC Power	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000
	Pan & Tilt Power	#18 AWG	4	• 120 VDC	7-Pin Connector Nucomm 512-F3003-070
Standard Triax (w/o P&T)	Triax Connector Trompeter PL375-13A Nucomm 511-F3002-000	Belden 8232A RG-59U (*recommended*)	N/A	• 70MHz IF • Inter-Unit Data • +48 VDC Power	Triax Connector Trompeter PL375-13A Nucomm 511-F3002-000
Standard Triax (w/ P&T)	Triax Connector Trompeter PL375-13A Nucomm 511-F3002-000	Belden 8232A RG-59U (*recommended*)	N/A	• 70MHz IF • Inter-Unit Data • +48 VDC Power	Triax Connector Trompeter PL375-13A Nucomm 511-F3002-000
	Pan & Tilt Power	#18 AWG	4	• 120 VDC	7-Pin Connector Nucomm 512-F3003-070
Alternate Coax *(requires Aux Power Option)* (w/o P&T)	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000	Belden 1505 (e.g.) RG-59U	N/A	• 70 MHz IF • Inter-Unit Data	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000
	Terminal Strip Nucomm 514-E0003-04A	#20 AWG	3	• +48VDC Power	15-pin connector ITT Cannon: MS3116J14 Nucomm 512-F3012-015
Alternate Coax *(requires Aux Power Option)* (w/ P&T)	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000	Belden 1505 (e.g.) RG-59U	N/A	• 70 MHz IF • Inter-Unit Data	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000
	Aux Power Cable	#20 AWG	3	• +48 VDC Power	15-pin connector ITT Cannon: MS3116J14 Nucomm 512-F3012-015
	Pan & Tilt Power	#18 AWG	4	• 120 VDC	7-Pin Connector Nucomm 512-F3003-070

Table 7: Typical IF cable configurations for the NewsCaster VT2

Control Unit "AUX Power"	Function	Recommended Wire Size	RF Head "AUX DC POWER"
1	+48 VDC	#18 Violet	A
3	+48 VDC	#18 Violet	B
2	Ground	#18 Black	G

Table 8: AUX Power cable pin-out

The following Tables and Figures are provided to assist in preparing the interconnect cables for the optional Pan & Tilt control.

Control Unit "PAN/TILT POWER"	Function	Recommended Wire Size (AWG)	RF Head "PAN/TILT PWR FROM CONTROL"
A	+160VAC*	#18 White	A
B	+160VAC*	#18 Red	B
C	Not Used		C
D	Not Used		D
E	–160VAC*	#18 Brown	E
F	–160VAC*	#18 Black	F
G	Not Used		G
H	Not Used		
*The motor for the 120 VAC Pan and Tilt actually requires 160 VAC.			

Table 9: Pan & Tilt Power (*120 VAC*) Connector Pin-outs

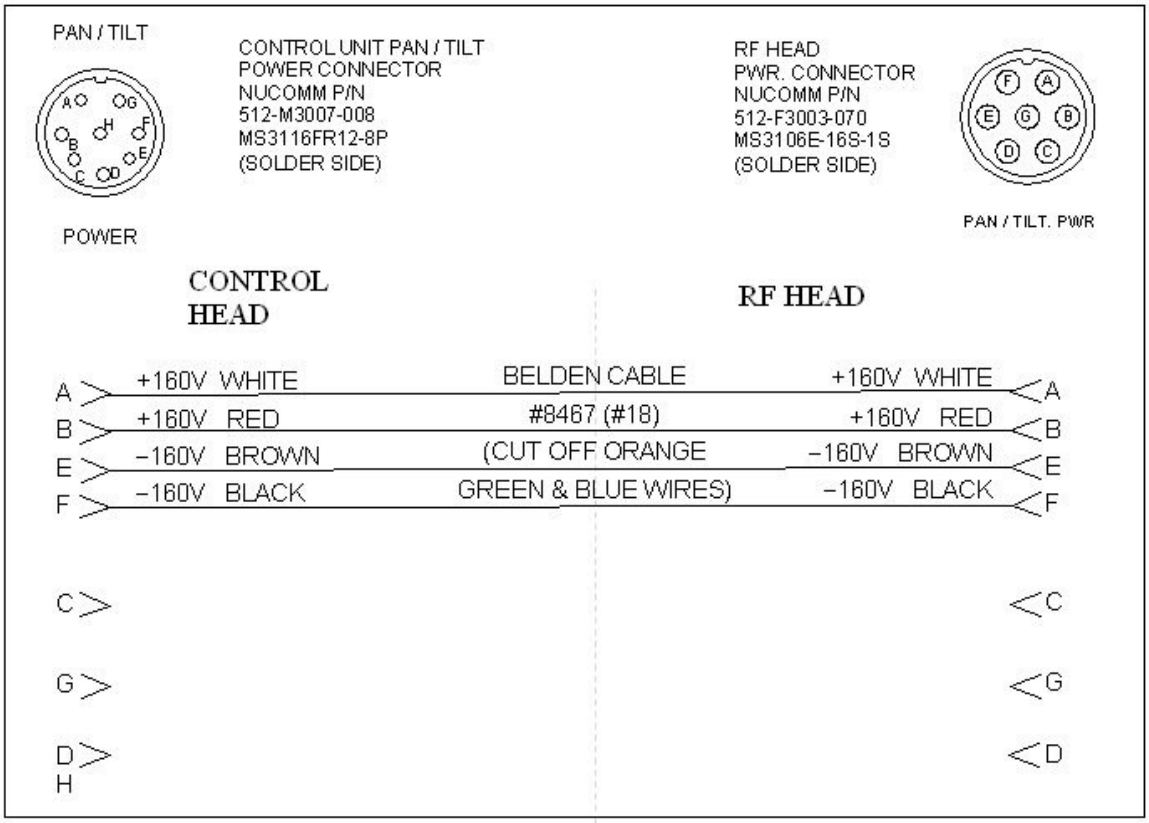


Figure 16: Pan & Tilt Power (*120VAC*) Interconnect Diagram

Control Unit "PAN/TILT POWER"	Function	Recommended Wire Size (AWG)	RF Head "PAN/TILT PWR FROM CONTROL"
A	+12VDC	#18 YELLOW	A
B	+12VDC	#18 YELLOW	B
C	GND	#18 BLACK	E
D	GND	#18 BLACK	F
No Connection	Not Used		C
No Connection	Not Used		D
No Connection	Not Used		G

Table 10: Pan & Tilt Power (*12 VDC*) Connector Pin-outs

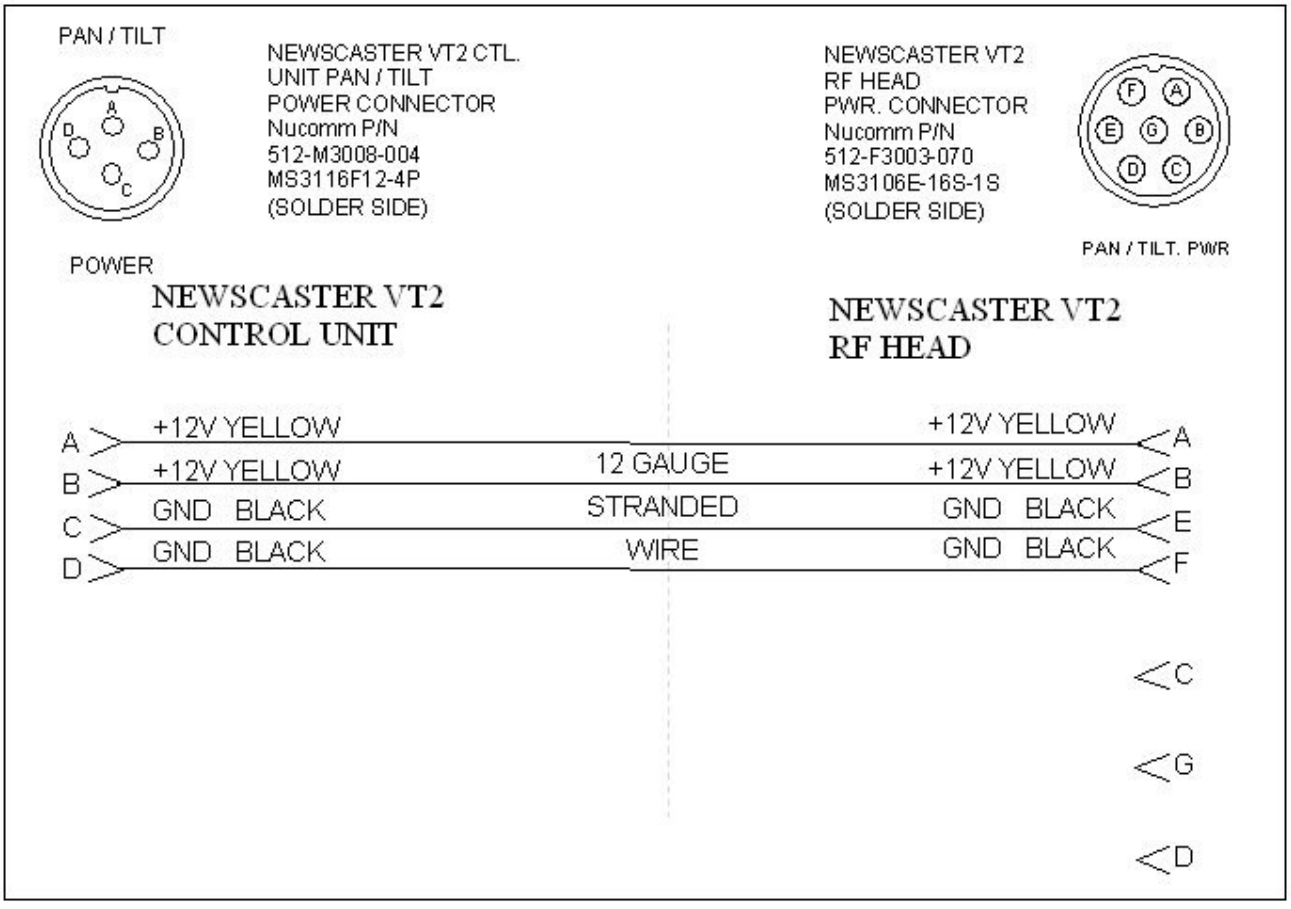
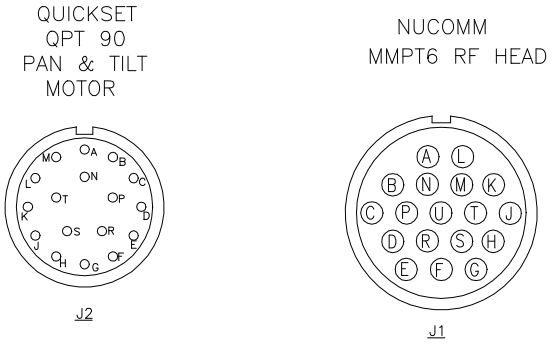


Figure 17: Pan & Tilt Power (*12 VDC*) Interconnect Diagram

RF HEAD "TO PAN/TILT" (18 PIN)	FUNCTION	RECOMMENDED WIRE SIZE (AWG)	PAN & TILT MOTOR (17 PIN)
A	N/C	#20 Green/Black	A
B	Position Pot-Ref B	#20 Orange/Black	B
C	N/C	#20 Blue/Black	C
D	Position Pot-Ref A	#20 Black/White	D
E	AZ Left	#20 Red/White	E
F	Elev. Pot Wiper	#20 Green/White	F
G	Chassis Ground	#20 Blue/White	G
H	Field "+" **(120 VAC Units Only)**	#20 Orange	H
J	Elev. Up	#20 Blue	J
K	Elev. Down	#20 White/Black	K
L	AZ Right	#20 Red/Black	L
M	Stow SW Up	#20 Red	M
N	Stow SW Down	#20 Green	N
P	Field "-" **(120 VAC Units Only)**	#20 Black	P
T	AZ Pot Wiper	#20 White	T
U	N/C	N/A	N/A

Table 11: Quickset QPT90 12 VDC/120 VAC Pan & Tilt Connector Pin-out

CONNECTORS:.....J2
.....AMPHENOL
MS3116F14-18S Provided with Quickset Unit)
.....J1
.....AMPHENOL
MS3106F20-29S
Cable: Belden # 9458, 15 Cond. #20



CABLE ASSY Lengths & P/N's	
LENGTH	P/N
4FT.	922-B206-04B
5FT.	922-B206-05B
6FT.	922-B206-06B*
12FT.	922-B206-12B

*Standard

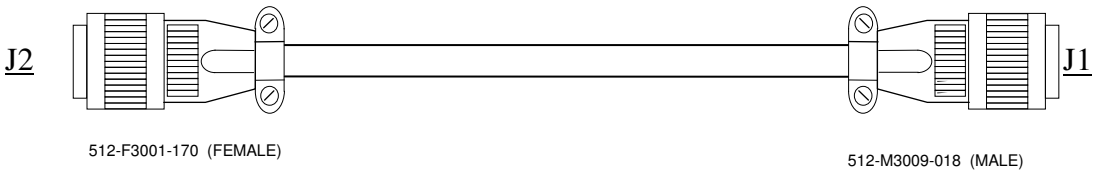


Figure 18: Pan & Tilt Motor Interconnect Cable

NCVT2 - RF HEAD	Function	Recommended Wire Size (AWG)	NSI Antenna
N/C	CW (Default)	N/C	N/C
E	V	#22 BROWN	A
C	H	#22 RED	B
D	2/7 GHz Band Select	#22 GREEN	L
F	CCW	#22 WHITE	D
G	Common Ground	#22 BLACK	N/C
K	Earth Ground	N/C	E
N/C	N/C	N/C	F
N/C	N/C	N/C	H
N/C	N/C	N/C	J
N/C	N/C	N/C	K
N/C	N/C	N/C	M

Table 12: NSI Quad Antenna Polarization Connector Pin Out

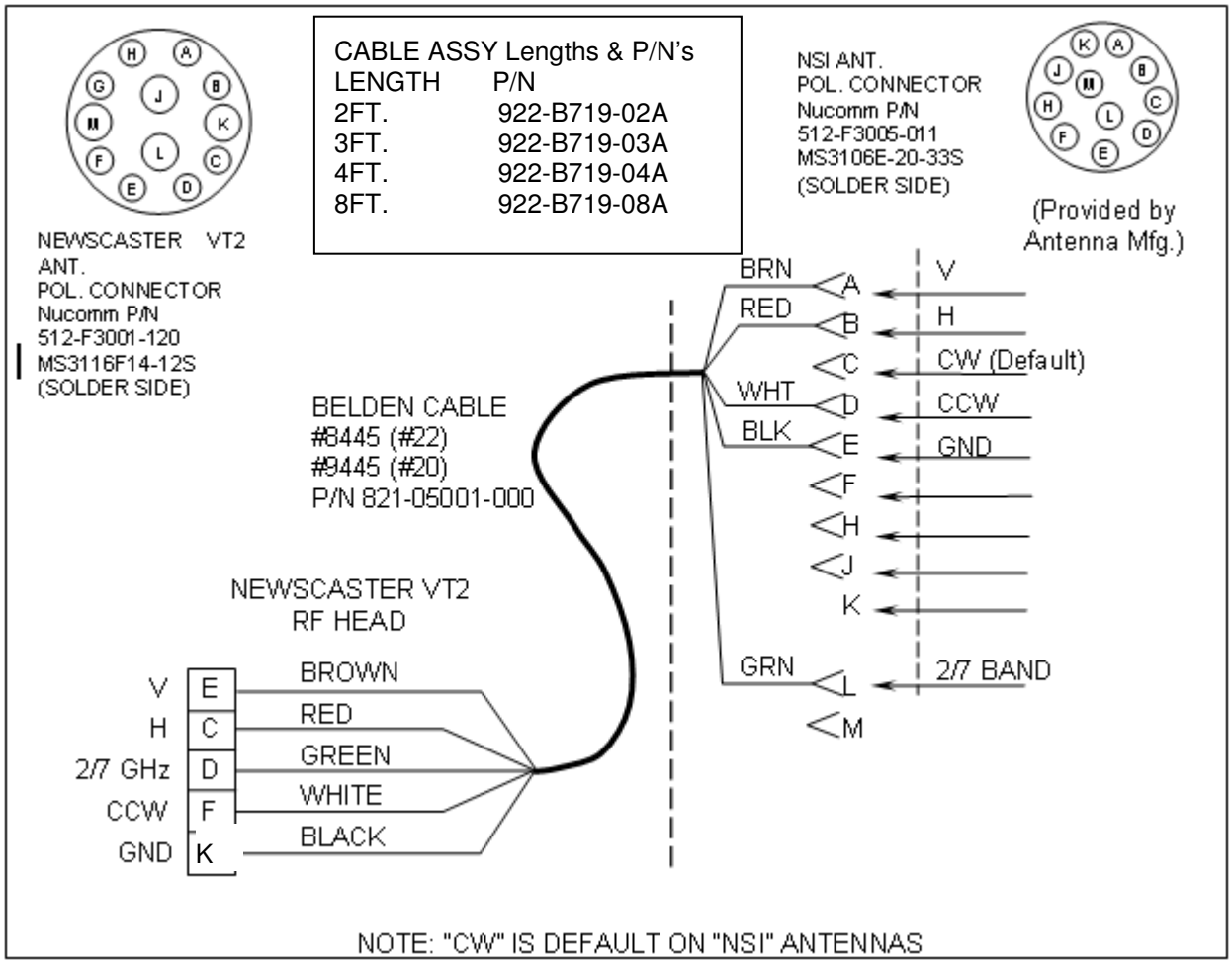


Figure 19: NSI Quad Antenna Polarization Connections

NCVT2 - RF HEAD	Function	Recommended Wire Size (AWG)	Radio Waves Antenna
N/C	CW (Default)	N/C	N/C
E	V	#22 BROWN	F
C	***H***	#22 RED	B
D	2/7 GHz Band Select	#22 GREEN	G
F	CCW	#22 WHITE	C
G	Common +24V	#22 BLACK	K
N/C	Shield GND	N/C	L
K	DC GND	#22 BLUE	M
N/C	N/C	N/C	A
N/C	N/C	N/C	D
N/C	N/C	N/C	E
N/C	N/C	N/C	H
N/C	N/C	N/C	J

Table 13: Radio Waves Quad Antenna Polarization Connector Pin Out

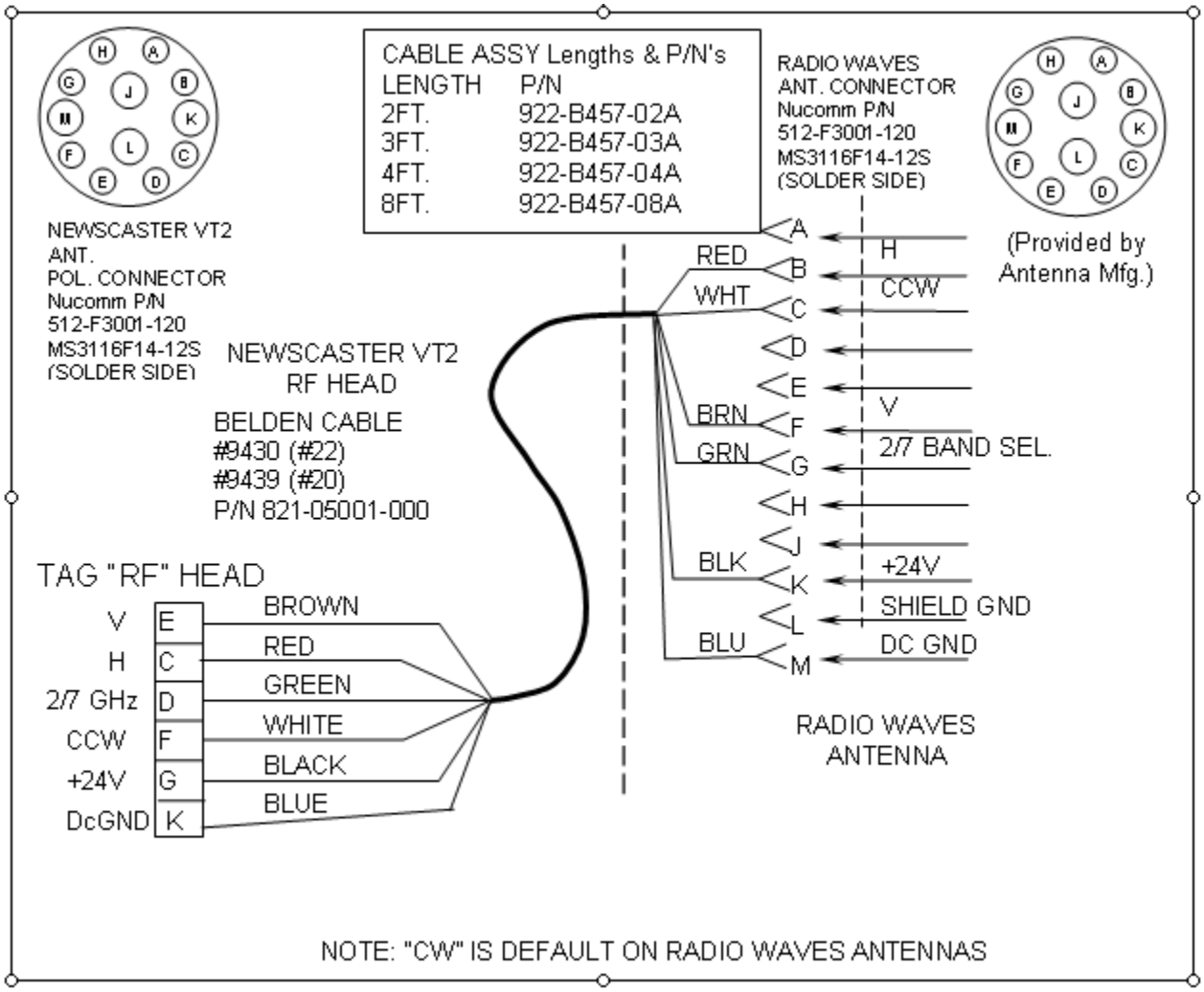


Figure 20: Radio Waves Quad Antenna Polarization Connections

4.8 RF HEAD CONNECTORS

IF Interface and AUX Power

The TNC, or Triax, IF connector inputs the diplexed 70 MHz, inter-unit control data, and DC power for the RF Head when Belden 1694, or Triax, cable is used. If RG-59 is used, then DC is input from the Aux Power cable via the Aux DC Power input. (Refer also to Figure 21, Detail 16.)

Antenna Polarization

This connector (*if configured*) receives the antenna polarity control signals from the Control Unit. Both NSI and Radio Waves antennas are compatible, as well as others. See Table 12 & Figure 19 for NSI details. See Table 13 & Figure 20 for RWI details. (Refer also to Figure 21, Detail 12.)

Pan / Tilt Power (from Control)

This connector (*if configured*) inputs power from the Control Unit, which is then passed on to the RF Head.
See Table 9 and Figure 16 for 120 VAC P&T.
See Table 10 and Figure 17 for 12 VDC P&T.
(Refer also to Figure 21, Detail 14.)

To Pan / Tilt

This connector (*if configured*) outputs signals and power for the Pan & Tilt unit. Refer to Table 11 and Figure 18 for cabling and pin-outs. (Refer also to Figure 21, Detail 13.)

RF Output

The RF output is via a Type-N connector located at the center rear of the NewsCaster VT2 RF Head, and carried via a 50 Ω low-loss coaxial cable to the antenna. Turn the cable connector clockwise, while keeping it in line with the transmitter connector. To avoid unnecessary connector wear, do not allow the cable to rotate while you connect it to the transmitter.

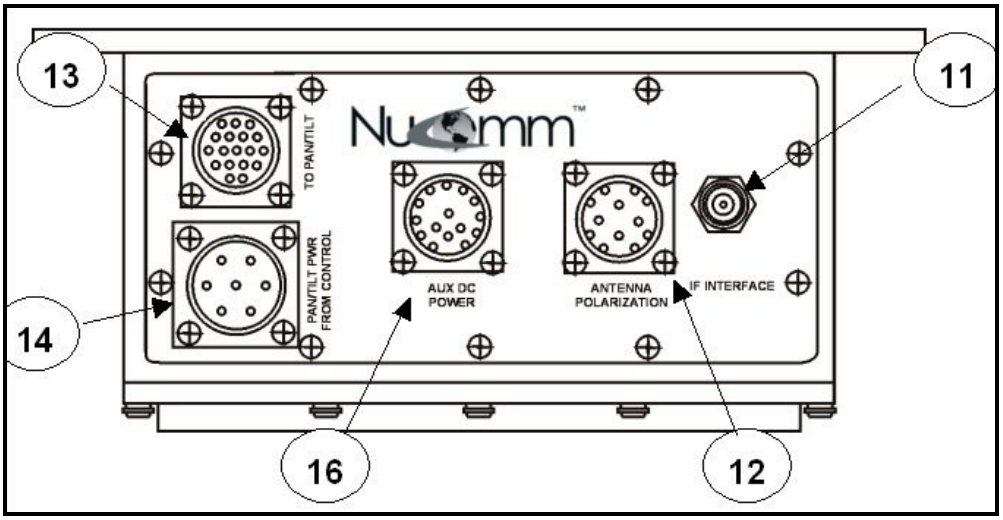
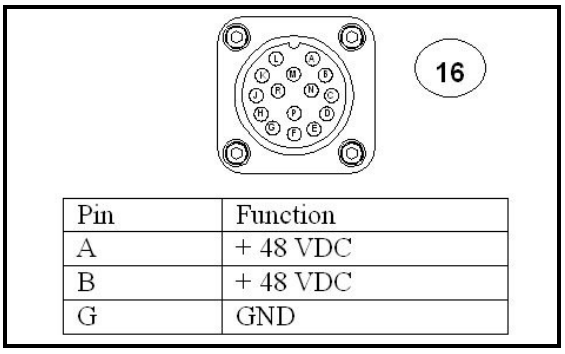


Figure 21: RF Head, Front-Panel (*shown w/Pan & Tilt option*)



Pin	Function
A	+ 48 VDC
B	+ 48 VDC
G	GND

Figure 22: RF Head AUX Power Connector

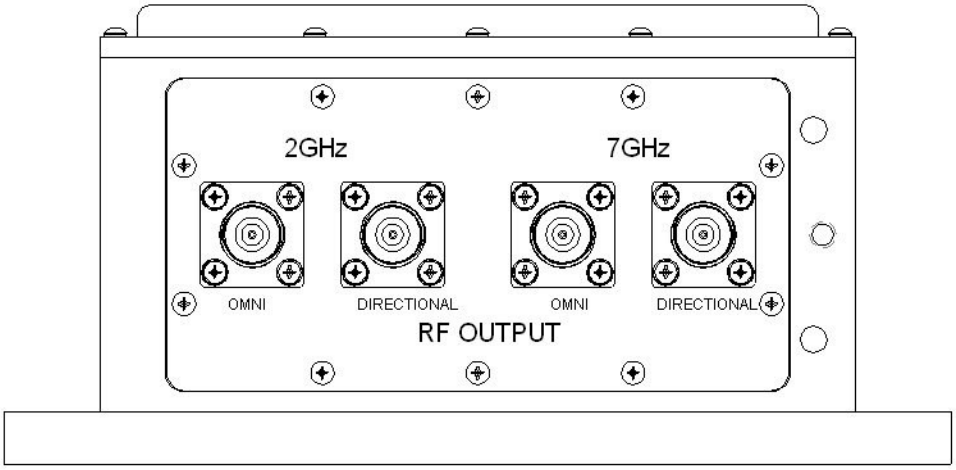


Figure 23: RF Head, Rear Panel

(*Dual Band shown, with optional Omni ports*)

WARNING!!!

DO NOT connect the wrong type cable to the wrong type unit, since doing so will damage one of the connectors and result in intermittent failures.

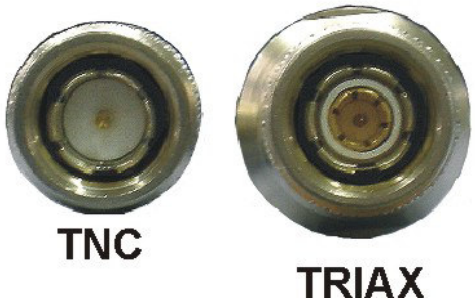


Figure 24: TNC and TRIAX Connectors

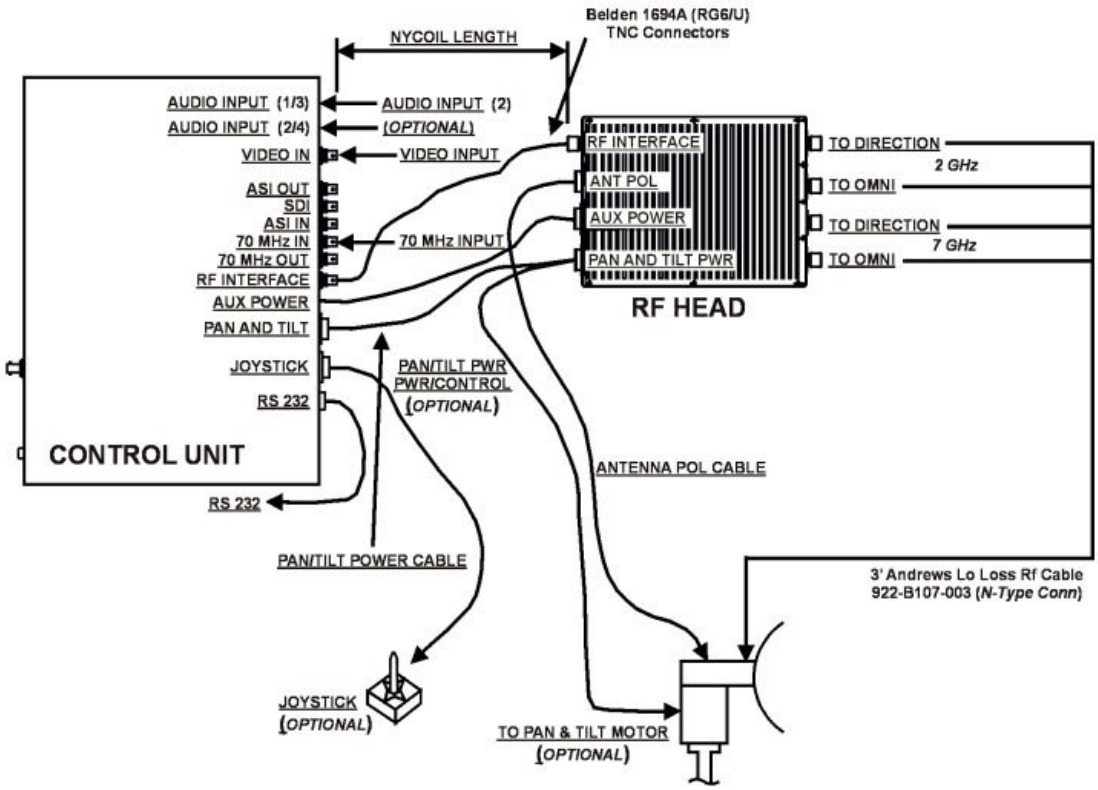


Figure 25: NCVT2 Interconnects

4.9 CONTROL UNIT / RF HEAD INTERCONNECT

Figure 25 shows the interconnects between the NewsCaster VT2 Control Unit and the mast mounted RF Unit. To assist in preparing the Control and Monitor cable, connector pin assignments and recommended wire sizes are provided. When Triax or Belden 1694 are used, the only conductors required to pass through the Nycoil for standard operation are the coax (*or Triax*) cable (*for power, data, and 70 MHz IF*) and optional power conductors if configured for Pan & Tilt. An auxiliary power cable is required if using 75 Ω RG-59 (*or optional 50 Ω RG-58*).

RF Head Connections

Perform the following:

- Connect the IF cable to the IF Interface jack. (Refer to Figure 21, Detail 11.)
- Connect the antenna polarization cable. (Refer to Figure 21, Detail 12.)

If the Pan/Tilt option is configured:

- Connect the Pan/Tilt Power cable to the RF Head (*7-pin*). (Refer to Figure 21, Detail 14.)
- Connect P1 (*18 pin, male*) of the Pan & Tilt Power/Control cable to J1 "TO PAN/TILT" on the RF Head. Connect P2 (*17 pin, female*) of the Pan & Tilt Power/control cable to the Pan & Tilt motor assembly. Refer to Table 11 and Figure 18 for cable pin-outs. (Refer also to Figure 21, Detail 13.)

If the AUX Power option is configured:

- Connect the AUX Power cable to the AUX DC POWER jack on the RF Head.

Connect the antenna cable between your antenna and the appropriate "RF OUTPUT" port: 2 GHz Omni; 2 GHz Directional; 7 GHz Omni; or 7 GHz Directional. (Refer to Figure 23)

NSI & Radio Waves Quad Antenna Polarization Interconnection

Wiring diagrams are provided to assist in preparing the polarization cable, including connector pin assignments and recommended wire sizes.

See Table 12 & Figure 19 for NSI details.
See Table 13 & Figure 20 for RWI details.

A software setting via the LCD interface is used to select between the two antenna types, and will be factory configured per the type specified when the order is placed.

Quickset QPT90 Pan & Tilt Interconnection

The Pan & Tilt platform will handle a maximum load of 90 lbs, with 0-355° of rotation and ± 90° of tilt. The unit features adjustable "limit" switches for rotation and tilt. The Pan & Tilt is controlled by an optional joystick, which is connected to the NEWSCASTER VT2 Control Unit. The operator is able to set the platform position to within 1 degree of the desired position. The Control Unit displays the azimuth and degree of rotation, as well as the tilt above and below the horizon.

Nucomm supports two input voltage versions of the Quickset QPT90, a 12 VDC version and a 120 VAC version. Table 11 and Figure 18 show the interconnection between both QPT90 versions and the RF Head. The interconnection between the Control Unit and the RF head is different for each version.

QPT90 - 120 VDC

See Table 9 and Figure 17 for details of the interconnection between the Control Unit and the RF Head for this Pan/Tilt Motor version.

QPT90 - 12 VDC

See Table 10 and Figure 16 for details of the interconnection between the Control Unit and the RF Head for this Pan/Tilt Motor version.

5. OPERATION

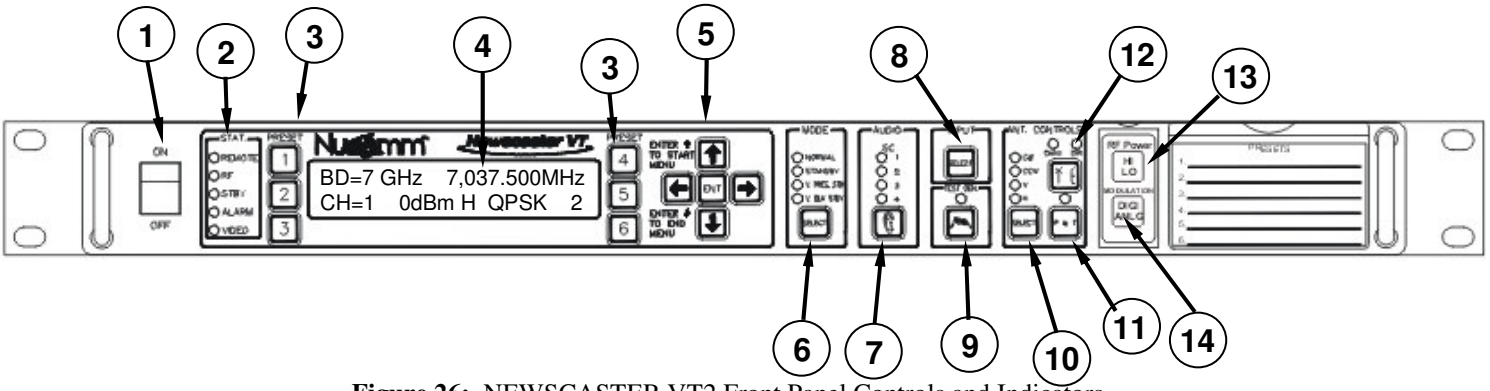


Figure 26: NEWSCASTER VT2 Front Panel Controls and Indicators

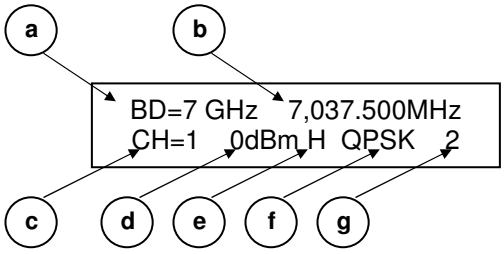
5.1 FRONT PANEL OPERATION

The NewsCaster VT2 operating controls and indicators are shown in Figure 26.

LCD Interface (4)

The LCD is the main interface to the unit. The display shown in Figure 26 is the Default Screen.

Default Screen



The Default Screen appears after boot-up and displays the following information:

(a) The current **Frequency Band**
(b) The current **Channel**
(c) The current channel **Frequency**
(d) The **RF Output Level** in dBm.
(e) The current **Power Level** (HI / LO)
(f) The current **Modulation Type**
(g) The current **Preset** selected (if any)

Entry Keypad (5)

This keypad is used to navigate the LCD menus. The ENT key is used to enter and exit from edit mode, and to make menu selections.

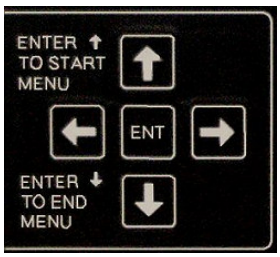


Figure 27: Menu Buttons

Basic Menu Navigation

On certain NCVT2 menu screens an underscore cursor appears, which may be moved using the left (←) or right (→) arrows. When the cursor is under a desired item, select the item by pressing **ENT** (*Enter*). Use the up (↑) or down (↓) arrows to scroll the available settings (refer to Figures 29 & 30). When the desired setting has been made, press **ENT** to save the entry and put any change(s) into effect. If **ENT** is not pressed and the keypad is left idle for 15 seconds, the changes are discarded.

To enter the Main Menu (see Section 5.3 for details), hold (↑) and press **ENT** . To exit back to the Default Screen, hold (↓) and press "ENT".

Band, Channel or Offset Selection:

You can change channels, offsets, or bands from the Default Screen.

- Press ENT to go into edit mode
- Move the cursor to the desired parameter (i.e. Band, Channel, Offset) and press ENT to select it.
- Press (↑) or (↓) to make any changes.
- Press ENT to save the new setting.

(Note: The Channel Offset is selected separately from the Channel, and the field is found to the right of the Channel Number.)

The unit will enter standby mode while the synthesizer changes frequency, and then resume transmission on the new frequency.

Frequency Direct:

If Frequency Direct Mode is enabled, the frequency may be changed without limitation to channels. Move the cursor to underline the frequency, and press the ENT key. Use the left and right arrows to select the digit(s) to edit, and the up and down arrows to change the value(s). Continue until the entire frequency has been set. When complete, press ENT to have the new frequency take effect.

If the frequency entered is outside the band of operation, the entry will be discarded, and an error message showing the valid range will be displayed. In this mode, the channel number is replaced with asterisks "********". To return to "Channel Mode", use the cursor to select a standard channel number.

5.2 CONTROLS AND INDICATORS

Power Mode (14)

The NewsCaster VT2 is set automatically to ANALOG or DIGITAL power mode based on the front panel user selection. This should not be confused with power output.

Power Output (13)

By pressing the HI/LO button **(13)**, the user can select the power output. The level at Lo power is down 6dBm from Hi.

ON/OFF (1)

Power On/Off control

STAT. (2)

The following show the unit's status:

- **Remote:** Unit is under remote control.
- **RF (*Green*):** RF present at output port.
- **STBY (*Yellow*):** Indicates muted output.
- **Alarm (Red):** Indicates that there has been a module problem. The exact reason for the alarm can be determined from the Alarm section of the Main Menu. (See Section 5.3)

Preset (3)

Six programmable preset keys are provided. To store the current settings, hold the desired Preset key until the confirmation screen is displayed (about four seconds). The settings to be saved include:

- **Modulation Type**
- **Input Type**
- **Output Power**
- **Channel Number**
- **Audio Settings**

Operating Mode (6)

The Operating Mode key is used to select from the following:

- **Normal:** Transmitter is active, with or without a video (or composite) input signal.
- **Standby:** Transmitter is in STANDBY until switched to another mode. To enable rapid transmission, the frequency synthesizer will remain locked on frequency in this mode.
- **Video Presence Standby:** This mode is only selectable when input is set to VIDEO. If no video is present, the transmitter will switch to STANDBY after a two-second delay (minimum). Use this mode to remotely place the transmitter into STBY when a video signal is removed. If the Test Generator is installed, the user may set Color Bars to be activated rather than have the unit go into STBY. (See Section 5.3.)

AUDIO (7)

The AUDIO quick key is used for basic **FM** audio mode, line/AES selection and gain changes. After the Audio Button is pressed, the Audio options will appear. The user must then select the desired audio channel.

Once the desired audio channel is selected, the arrow keys are used to scroll through the parameter list.

The gain or mode selection is made using the left or right arrow keys and edited using the standard editing procedure. Additional audio channels are selected with the up and down arrows. To edit sub-carrier frequency, refer to Section 5.4.1.

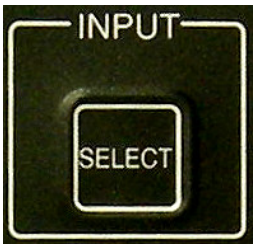
Note: *When changing the sub-carrier frequency range, the values are altered by highlighting the character and using the arrow keys to increase or decrease the value. To enter the value, move the cursor to the "M"* (last character) *and press the "ENT" Button.*

The gain adjustment allows for ± 6 dB of gain, and can be used to compensate for variance in line levels. Audio levels will be expressed in dBm when using analog modulation, and in dBu when in digital, per the following:
P_{dBm} + Gain -18 = P_{dBu}
0.0 dBm = -18 dBu

If **LINE** is selected, the unit accepts balanced 600 Ω inputs at +8 dBm Analog (–10 dBu Digital). At 1 kHz input, headroom is +18 dBm Analog (0.0 dBu Digital).

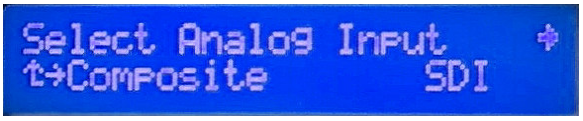
If **AES** is selected, the unit accepts data from the backplane AES port(s) and decodes the Group 1 audio from the SDI stream. If only two audio channels are configured, they will be the first channel in Group 1.

Four LED's indicate the status of the audio channel:
GREEN: On and working - OK.
GREEN Flashing: Over modulation.
RED: Trouble indication.
OFF: Off, or not configured.



INPUT (8)

Pressing the **INPUT** key, brings up the Select Input Screen. This allows the user to decide upon the type of input to be fed to the unit.



When analog modulation is selected, the input selections will be:

Composite - The signal applied at the INPUT connector is routed through the internal low pass filter and sent to the FM modulator. (*Typically, this filter has a bandwidth of about 4.0 MHz for NTSC and 5.6 MHz for PAL. The NTSC filter selectivity ensures the higher frequency video components do not interfere with the 4.83 MHz audio sub-carrier.*)

SDI - SDI is converted to Composite via an internal circuit and then processed as a Composite signal.

External 70 MHz FM - The input bypasses the modulator, and is routed directly to the heterodyne up-converter.

When digital modulation is selected, the input selections will be:

Composite - In this mode, the input signal is passed through the MPEG Encoder and converted to digital, then routed to the digital modulator.

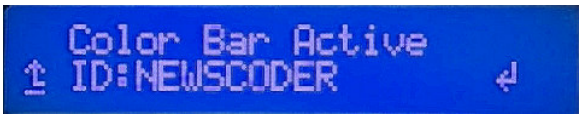
SDI - The Input is routed through the MPEG Encoder, and then to the digital modulator.

External 70 MHz Digital - The input bypasses the modulator, and routes to the heterodyne up-converter.

ASI - Input bypasses the Encoder and goes to the digital modulator. The ASI rate must be at or below the maximum digital modulation rate.

TEST GEN (9)

This toggle key turns on/off the internal color bars, and also allows editing of the 16 character ID, as well as selection of the tone levels. TEST GEN may only be selected when the input type is set to COMPOSITE.



When TEST GEN is enabled, the green LED will light and the LCD will display the screen shown above. The ID can be edited from this screen.

To modify the TEST TONE levels, press the right (→) arrow twice and the TONE LEVEL screen will appear. The tone levels can be set from -26dBFS to -10dBFS.

ANTENNA CONTROL (10)

This key is used to set the antenna polarization (if configured) to CW, CCW, H or V.

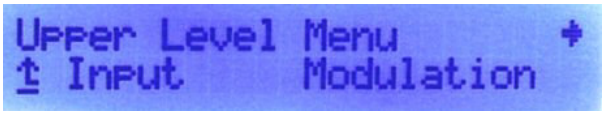
ANTENNA SELECTION (12)

This key toggles the RF output between the Omni and Directional output ports. If no Omni is connected, then this function should be disabled. (See Options in Section 5.3.)

PAN &TILT (11)

When Pan & Tilt is pressed, the Red indicator LED is lit to indicate P/T power is enabled. Any joystick movement will move the antenna in that direction. A display for P/T elevation and aximuth is available. When operating the Pan & Tilt, the antenna movement MUST also be physically monitored to reduce the danger of hitting power lines, etc. When the desired position is reached, press Pan & Tilt again to disable power to the motor and reduce the possibility of unintentional antenna movement.

5.3 MAIN (UPPER LEVEL) MENU



The Main or "Upper Level" Menu allows the user to access sub-menus in order to vary the operational parameters of the unit. Refer to Figure 29 and Figure 30 for tree diagrams of the menu system.

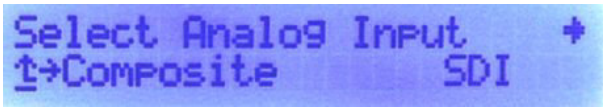
To enter the Main Menu, hold (↑) and press "ENT". To select a sub-menu, move the cursor to the desired item and press "ENT". To move back up a level, select (←) at the upper left of the screen and press "ENT".

The sub-menus consist of:

- **Input** - for selecting the type of input signal to the unit.
- **Modulation** - for varying the type of output modulation.
- **Encoder** - for varying any parameters associated with the encoding of the output signal.
- **System** - for varying miscellaneous unit parameters.
- **Monitor** - for monitoring different operational parameters of the unit.
- **Alarm** - for viewing any alarm condition occurring. (*Alarms are listed by priority and not by occurrence.*)

Use the *Left and Right Arrow Buttons* to scroll through all the options.

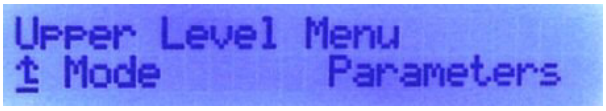
INPUT MENU



The Input Menu is used to set the type of signal that will be inputted to the unit.

- **Composite**
- **SDI**
- **70 MHz**
- **ASI**

MODULATION MENU



The Modulation settings are modified under this menu, which has two sections: Mode and Parameters.

Mode

Mode allows the user to select the Digital Mode of Operation (*COFDM, DVB-S, and VSB*). Analog is limited to FM only.

Parameters

The Parameters sub-menu has Analog (*FM*) parameters and Digital (*COFDM, DVB-S, and VSB*) parameters, as described below.

FM PARAMETERS

The FM (*analog*) parameters are divided into two sections: Audio and Video.

FM Audio Settings

This menu displays the audio channels for editing. (Each channel has the same parameters.):

- **SC1L (*Audio 1 Left*)**
- **SC1R (*Audio 1 Right*)**
- **SC2L (*Audio 2 Left*) (if installed)**
- **SC2R (*Audio 2 Right*) (if installed)**

1. **Input** - selects the type of audio input source going to the VT2 (Line [*analog source*], Tone [*self-generated source*], AES/EBU [*digital source*], and Off.

2. **Insertion** - adjusts the input audio level from –40 dB to –20 dB.

3. **Gain** - adjusts the audio output level from –6 dB to +6 dB.

4. **Freq** - allows the user to select the FM Audio Channel sub-carrier bandwidth.

FM Video Settings

Under the FM Video sub-menu, the operator may change three parameter settings. These are:

1. **Inverse** - which can set the video waveform to Normal (*in-phase*) or Inverted (*180° out-of-phase*).

2. **Emphasis** - allows the operator to switch between Video Emphasis Mode or Video Flat Mode. (*In Video Emphasis Mode, the lower video frequencies are rolled-off, while high frequencies are amplified*.)

3. **Filter** - sets the bandwidth of the video filter. This is used to ensure that the audio sub-carriers do not cause interference with video signal when required. The choices are: Bypass (*filter off*) or bandwidths of 3.9 MHz, 4.5 MHz, 4.75 MHz, or 5.6 MHz. **Note: In PAL mode, only 5.6 MHz and Bypass are allowed.**

COFDM PARAMETERS

The COFDM (*digital*) parameters consists of five options:

1. **Power** - toggles the COFDM modulator "On" or "OFF".

2. **Constellation** - provides several different methods of modulating the signal for transmission:

- **QSPK**
- **16-QAM**
- **64-QAM**

3. **Code Rate**

Under the Code Rate sub-menu, the user can set the amount of error correction. The Code Rate (*as well as Guard Interval, Bandwidth, and Modulation*) is instrumental in setting the proper Data Rate. The options for the Code Rate sub-menu are:

- **1/2** - code rate used for channels with the greatest amount of noise.
- **2/3**
- **3/4**
- **5/6**
- **7/8** - code rate used for channels with the least amount of noise.

4. **Guard Interval** - COFDM carriers have a precise spacing between each frequency. This spacing ensures that only one carrier is addressed at a time, and that no crosstalk exists between carriers.

Under the Guard sub-menu, the user can set the amount of delay interval between symbols. The options for this sub-menu are:

- **1/32** - shortest delay between symbols.
- **1/16**
- **1/8**
- **1/4** - longest delay between symbols.

5. **Bandwidth** - The bandwidth is the span or width of a carrier frequency. Under the Bandwidth sub-menu, the user can select the size of the carrier bandwidth. The options for this sub-menu are:

- **6 MHz** - usually used for a "split-channel" due to having the faster "band re-growth" drop-off rate. The signal must be offset by using either + or – channels.(*This technique works best in the lower RF power equipment, which keeps re-growth to a minimum*.)
- **7 MHz**
- **8 MHz -** has the slowest "band re-growth" drop-off rate.

Use Tables 14 through 16 to identify the parameters required to set the desired COFDM data rate:

Table 14: COFDM Data Rates (*8 MHz Bandwidth*)

Modulation System	Code Rate	Guard Interval			
		1/32	1/16	1/8	1/4
IF = 9.142857 MHz Clk=36.571429 Mbit/s		Flo = 60.857143 MHz		**BW = 8 MHz**	
		Data Rate (Mbit/s)			
QPSK	1/2	6.032086	5.854671	5.529412	4.976471
	2/3	8.042781	7.806228	7.372549	6.635294
	3/4	9.048128	8.782007	8.294118	7.464706
	5/6	10.053476	9.757785	9.215686	8.294118
	7/8	10.55615	10.245675	9.676471	8.708824
16-QAM	1/2	12.064172	11.709342	11.058824	9.952942
	2/3	16.085562	15.612456	14.745098	13.270588
	3/4	18.096256	17.564014	16.588236	14.929412
	5/6	20.106952	19.51557	18.431372	16.588236
	7/8	21.1123	20.49135	19.352942	17.417648
64-QAM	1/2	18.096258	17.564013	16.588236	14.929413
	2/3	24.128343	23.418684	22.117647	19.905882
	3/4	27.144384	26.346021	24.882354	22.394118
	5/6	30.160428	29.273355	27.647058	24.882354
	7/8	31.66845	30.737025	29.029413	26.126472

Table 15: COFDM Data Rates (7 *MHz Bandwidth*)

Modulation System	Code Rate	Guard Interval			
		1/32	1/16	1/8	1/4
IF = 7.999999875 MHz Clk=32.0000 Mbit/s		Flo = 62.000000125 MHz		**BW = 7 MHz**	
		Data Rate (Mbit/s)			
QPSK	1/2	5.27807525	5.12283713	4.8382355	4.35441213
	2/3	7.037433375	6.8304495	6.45098038	5.80588225
	3/4	7.917112	7.68425613	7.25735325	6.53161775
	5/6	8.7967915	8.53806188	8.06372525	7.25735325
	7/8	9.23663125	8.96496563	8.46691213	7.620221
16-QAM	1/2	10.5561505	10.2456743	9.676471	8.70882425
	2/3	14.07486675	13.660899	12.9019608	11.6117645
	3/4	15.834224	15.3685123	14.5147065	13.0632355
	5/6	17.593583	17.0761238	16.1274505	14.5147065
	7/8	18.4732625	17.9299313	16.9338243	15.240442
64-QAM	1/2	15.83422575	15.3685114	14.5147065	13.0632364
	2/3	21.11230013	20.4913485	19.3529411	17.4176468
	3/4	23.751336	23.0527684	21.7720598	19.5948533
	5/6	26.3903745	25.6141856	24.1911758	21.7720598
	7/8	27.70989375	26.8948969	25.4007364	22.860663

Table 16: COFDM Data Rates (6 *MHz Bandwidth*)

Modulation System	Code Rate	Guard Interval			
		1/32	1/16	1/8	1/4
IF = 6.85714275 MHz Clk=27.428571 Mbit/s		Flo = 63.14285725 MHz **Data Rate (Mbit/s)**		**BW = 6 MHz**	
QPSK	1/2	4.5240645	4.48248248	4.2334561	3.81011061
	2/3	6.03208575	5.854671	5.5294118	4.9764705
	3/4	6.786096	6.58650525	6.2205885	5.5985295
	5/6	7.540107	7.31833875	6.9117645	6.2205885
	7/8	7.9171125	7.68425625	7.2573533	6.531618
16-QAM	1/2	9.048129	8.7820065	8.294118	7.4647065
	2/3	12.0641715	11.709342	11.058824	9.952941
	3/4	13.572192	13.1730105	12.441177	11.197059
	5/6	15.080214	14.6366775	13.823529	12.441177
	7/8	15.834225	15.3685125	14.514707	13.063236
64-QAM	1/2	13.5721935	13.1730098	12.441177	11.1970598
	2/3	18.0962573	17.564013	16.588235	14.9294115
	3/4	20.358288	19.7595158	18.661766	16.7955885
	5/6	22.620321	21.9550163	20.735294	18.6617655
	7/8	23.7513375	23.0527688	21.77206	19.594854

VSB PARAMETERS

1. **Type** - provides several different methods of modulating the signal for transmission:

- **2VSB**
- **4VSB**
- **8VSB**
- **8VSB-T**

2. **Bandwidth** - The bandwidth is the span or width of a carrier frequency. Under the Bandwidth sub-menu, the user can select the size of the carrier bandwidth. The options for this sub-menu are:

- **6 MHz**
- **7 MHz**
- **8 MHz**

BW = 6 MHz		**Data Rate (Mbit/s)**
VSB	2 VSB	9.7
	4/8T VSB	19.4
	8 VSB	29.1

BW = 7 MHz		**Data Rate (Mbit/s)**
VSB	2 VSB	11.3
	4/8T VSB	22.6
	8 VSB	33.9

BW = 8 MHz		**Data Rate (Mbit/s)**
VSB	2 VSB	12.9
	4/8T VSB	25.5
	8 VSB	38.8

Table 17: VSB Data Rates

Note: the data rate for non-Trellis coded 4 VSB is the same as 8 VSB with Trellis coding (8T VSB). 8T VSB @ 6MHz is the ATSC standard.

ENCODER MENU

The Encoder Menu allows the user to adjust the MPEG Encoder's operating parameters. The menu accesses four sub-menus. They are:

- **Audio**
- **Video**
- **Table**
- **GOP**

Audio Settings

The Audio Settings allow the user to select the audio scheme to be used with the MPEG Encoder. After entering the Audio Menu, select either Audio 1 or Audio 2 (*if configured for two digital audios*). After selecting the audio channel, there are four parameters that can be set:

1. **Input** - (Line [*analog source*], Tone [*self-generated source*], AES/EBU [*digital source*], and Off.

2. **Sample Rate** - the rate is set at 48 kHz and is not changeable.

3. **(*Input*) Level (L)** - sets the left-channel audio input level to the encoder from –6 dB to +6 dB.

4. **(*Input*) Level (R)** - sets the right-channel audio input level to the encoder from –6 dB to +6 dB.

Video Settings

The Video Settings allow the user to select the video formatting to be used with the MPEG Encoder. They are:

1. **Standard** - can be toggled between:
   - **NTSC**
   - **PAL**

2. **Profile** - can be toggled between:
   - **4:2:0**
   - **4:2:2**

3. **Aspect Ratio** - can be toggled between:
   - **4:3** - Normal full-screen TV.
   - **16:9** - Wide-screen TV.

Table Settings

MPEG-2 data packets consist of 188 bytes of information, with the package identifier (PID) located at the start of each packet.

The user can set PID values in the **Tables** sub-menu. The options are:

- **Service** - allows the user to set the Service Name.
- **Provider -** allows the user to set the name of the Service Provider.
- **PCR PID** - allows for setting the hexadecimal value for the Program Clock Reference (to synchronize the video and audio packets). Typically found in the video stream.
- **Video PID** - allows the user to set the hexadecimal value for video stream.
- **Audio1 PID** - allows the user to set the hexadecimal value for the audio 1 stream.
- **Audio 2 PID** - (*if configured*) allows the user to set the hexadecimal value for the audio 2 stream.

NOTE: *Each PID must be a unique value.*

GOP Settings

With the GOP sub-menu, the user can set the type of frames, the amount frames, and the sequence used. The options for this sub-menu are:

- **0: Super Low Density** - very fast encoding with low latency.
- **1: IP–15** - encoding utilizing Intra and Prediction frames, with a sequence of 15 frames.
- **2: IP–45** - encoding utilizing Intra and Prediction frames, with a sequence of 45 frames.
- **3: IPB–15** - encoding utilizing Intra, Prediction, and Bi-directional frames, with a sequence of 15 frames.
- **4: IPB–45** - encoding utilizing Intra, Prediction, and Bi-directional frames, with a sequence of 45 frames.
- **5: IPBB–15** - the slowest encoding utilizing Intra, Prediction, and Bi-directional frames, with a sequence of 15 frames, but with double bi-directional frames. It has the highest type of encoding quality.

SYSTEM MENU

The System Menu is used to set various parameters regarding operational behavior of the system. There are seven sub-menus:

- **Options**
- **Remote**
- **Frequency**
- **Version**
- **Restore**
- **Factory**
- **Nextel**

Option Settings

1. **Frequency Direct** - This optional operating mode allowing the frequency to be changed without conventional use of a channel. It can be toggled "On" or "Off".

To use Frequency Direct (*when it is* ***enabled***) use the following procedure:

In the Default Screen, move the cursor to underline the frequency, and press the "ENT" key. Use the left and right arrows to select the digit(s) to edit, and the up and down arrows to change the value(s). Continue this procedure until the entire frequency has been set. When complete, press "ENT" to have the new frequency take effect.

If the frequency entered is outside the band of operation, the entry will be discarded, and an error message showing the valid region of operation will be displayed.

In this mode, the channel number is replaced with asterisks "****". To return to channel mode, select the channel with the cursor and change it to the desired channel number.

2. **Start in Standby** - This option either places the unit in Standby Mode after booting-up (*Yes*), or places the unit into Transmit Mode after booting-up (*No*).

Caution: *if the power to the unit is interrupted for any reason, the unit will not return to transmit without user intervention.*

3. **Save Preset** - allows the user to enable (*Yes*) or disable (*No*) the saving of Presets.

4. **Directional Antenna Only** - allows the user to select between the system usage of a Directional Antenna only (*Yes*), or system usage of both Directional and Omni antennas (*No*). When the latter selection has been chosen, the user must use the Antenna Button (*Front Panel*) to toggle between the two different types of antennas. (Refer to Figure 28.)

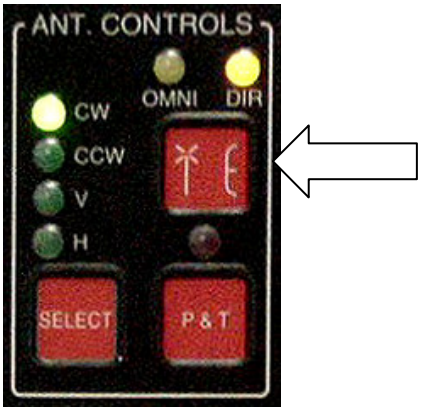


Figure 28: Antenna Button

5. **P & T (*Pan & Tilt*) Position Pots** - This parameter indicates to the Control unit whether or not the Pan & Tilt Potentiometers have been installed. If the Pan and Tilt control potentiometers are installed, then this option must be set to "*YES*"*, otherwise it is set to* "*NO*".

6. **Elevation THD** - enables (*Yes*) or disables (*No*) a threshold range in which the elevation can travel. It is used to halt the Pan function when the selected elevation has been exceeded in order to avoid equipment damage.

7. **Nucomm Antenna** - allows the user to choose between Nucomm (*Yes*) and NSI (*No*) type antennas. This is factory set per the configuration ordered.

8. **Video Present** - allows the user to choose between Standby Mode, or color bars generation when video signal is lost.

9. **Show Nextel Menus** - allows the user to choose between displaying (*Yes*) or hiding (*No*) the Nextel BAS Relocation menu.

Remote Settings

The Remote Settings Menu allows the NewsCaster VT2 to communicate to other devices, such as a PC or PDA. It is important to match all handshaking protocols for the two devices to communicate with each other.

1. **Mode** - sets up the type of control location. There are two choices:
   - **Remote/Local** – allows the user to control the unit by a remotely connected computer and/or the Front Panel.
   - **Local Only** – allows the user to control the unit by the Front Panel.

2. **Interface** - the user can select the type of interface communication. These are either RS232, or RS485.

3. **Address** - the user can assign an address to the VT2.

4. **Baud Rate** - the user can select the speed of the serial data communication. The speed can be 2400 bps, 9600 bps, or 19200 bps.

Version Settings

This menu serves ***only as a monitoring function***. It allows the user to only view the unit's **Serial Number**, **Model Number**, the version of **Front Panel Software, Up-Converter,** and **Frequency Plan**.

Restore Settings

This menu allows the user to restore all factory settings. The choices are "YES" or "NO".

WARNING!!!

Restoring factory default values WILL OVERWRITE ALL USER SETTINGS!

Frequency Settings

This menu allows the user to modify the frequencies of the currently selected band-plan.

Factory Settings

The Factory Settings Menu is ***only to be used by authorized service personnel*** and is password protected. Unauthorized changes to its parameters may void the warranty and/or damage the equipment. For further information, contact Nucomm Inc.

WARNING!!!

Changing values under the Factory Menu MAY CAUSE THE UNIT TO CEASE OPERATION!

Nextel

This menu allows the operator to modify the Nextel BAS Relocation Settings. (Refer to Section 5.4 for additional details on BAS relocation settings.)

MONITOR MENU

The Monitor Menu allows the user to verify different operational parameters, settings, and software downloads. It is made up of five sub-menus:

- **PSU** - for monitor the minimum, current, and maximum voltages of the Power Supply Unit.

NOTE: *For the PSU, all voltages are set to alarm at a condition of ± 10%.*

- **Temperature** - for monitoring the current temperature of the Control Unit, and RF Head.
- **Modulator** - for verifying the version of the unit and its software versions for its various components

(*EPROMs, FPGA, etc*.), including the current ASI rate fed to the system, and the maximum rate supported by the system.

- **Up-Converter** - for monitoring the Up-Converter voltages and verifying is software version.
- **RF Head** - for monitoring the aspects and data of the RF Head section.
- **Front Panel** - for monitoring the aspects and data of the Front Panel section.

ALARMS SCREEN

The Alarms Screen provides the user with a list of current unit alarms that have been triggered by a problem with either the signal reception or with the receiver itself. Using this tool, the unit can be troubleshot to correct all problems. (*Previous alarm states are not listed under this screen. The alarm state is listed here only as long as the alarm is on. Should an alarm occur during operation, the "Alarm LED" will also illuminate*.)

Alarms are listed by priority and not by occurrence.

See Section 5-5 for Troubleshooting.

5.4 NEXTEL BAS RELOCATION SETTINGS

For our US clients, the ChannelMaster is designed so that, when properly configured per the following guidelines, **you will only need to change one setting, on one screen** when it's time to switch over to the "post-Nextel" 2GHz band plan.

To preset the unit to allow a "one setting" switchover, there are two groups of settings that must be made in advance: "AUDIO SUB-CARRIER FREQUENCY" and "CHANNEL BANDWIDTH & BAND PLAN". These are described below.

5.4.1 Audio Sub-Carrier Frequency

In this section you set your "pre-Nextel" and "post-Nextel" Audio Sub-Carrier (ASC) frequencies, so that when you make the switchover they will be ready to go.

Start the ASC set-up procedure by making the following menu selections:
MODULATION>PARAMETERS>FM>AUDIO>SC1L

This brings up a screen similar to the one at right, with the settings and selections as described below:

← **SC1 Insertion:** (-20 to -40dBc) **2(17)/7/13:** 4.83 MHz **2(12) 1-7:** 4.83 MHz **2(12) 8-10:** 4.83 MHz

NOTE: Press "Up" & "Down" to scroll through the ASC's, and press "Left" & "Right" to scroll through the available settings. The settings for all ASC's are modified in the same fashion. ASC#1 is used as the example.

2(17)/7/13 This setting controls the frequency for the selected Sub-Carrier when operating in the "pre-Nextel" 2 GHz band (USA), and also for all the other frequency bands (i.e. 7 GHz or 13 GHz). The possible range for this setting is 4.83 MHz to 8.5 MHz.

2(12) 1-7 This setting controls the frequency for the selected Sub-Carrier when operating in the "post-Nextel" 2 GHz band (USA) on channels 1 through 7. The possible range for this setting is 4.83 MHz to 5.8 MHz

2(12) 8-10 This setting controls the frequency for the selected Sub-Carrier when operating in the "post-Nextel" 2 GHz band (USA) on channels 8 through 10. The possible range for this setting is 4.83 MHz to 8.5 MHz

Nucomm's default Audio Sub-carrier Frequencies				
Band-plan	ASC1	ASC2	ASC3*	ASC4*
2(17)/7/13	4.83 MHz	6.20 MHz	6.80 MHz	7.50 MHz
2(12) 1-7	4.83 MHz	5.80 MHz	6.80 MHz	7.50 MHz
2(12) 8-10	4.83 MHz	6.20 MHz	6.80 MHz	7.50 MHz
***NOTE:** Due to bandwidth limitations, only two ASC's can be active on the "post-Nextel" 2 GHz band-plan (US), regardless of how the unit is hardware configured.				

5.4.2 Channel Bandwidth and Band Plan

In this section you can set your "pre-Nextel" and "post-Nextel" Video Bandwidth Deviation, so that when you make the switchover they will be ready to go.

Start this set-up procedure by making the following menu selections:
SYSTEM>NEXTEL FREQ PLAN

This brings up the screen at right, with the settings and selections as described below:

2GHz Freq Plan: *2G(17), 2G(12)*
BW(2G(17)/7/13): *4MHz, 3MHz*
BW(2G(12)8-10): *4MHz, 3MHz*

2 GHz Freq Plan — This setting controls the 2 GHz Frequency Plan which will be used by the radio. Select the 17 MHz "pre-Nextel" band-plan by choosing "2G(17)", or the 12 MHz "post-Nextel" band-plan by choosing "2G(12)".

BW(2G(17)(7/13) — This setting controls your Video Deviation bandwidth when operating in the "pre-Nextel" 2 GHz band (USA), and also for all the other frequency bands (i.e. 7 GHz or 13 GHz). The possible selections are 3 MHz or 4 MHz.

BW(2G(12) 8-10) — This setting controls the Video Deviation bandwidth when operating in the "post-Nextel" 2 GHz band (USA) on channels 8 through 10. The possible selections are 3 MHz or 4 MHz.

NOTE: Due to bandwidth limitations of the "post-Nextel" 2 GHz band-plan, in "2G(12)" mode, the Video Deviation bandwidth of 2 GHz channels 1 through 7 is locked at 3 MHz..

5.4.3 Switchover to "Post-Nextel" Settings

For our US clients, when your DMA switchover date arrives, assuming you have already set the unit per the preceding guidelines, you will only need to take the following steps to put the radio on the new "post-Nextel" settings:

Step #1: Navigate to the following menu: SYSTEM>NEXTEL FREQ PLAN

Step #2: Change your "2 GHz Freq Plan" setting from "2G(17)" to "2G(12)"

Step #3: Done!

5.5 TROUBLESHOOTING GUIDE

NewsCaster VT2 Alarms		
Alarm Message	**Problem**	**Probable Cause/Troubleshooting**
FP: Data Error	A setting is set to an illegal value.	1. Power cycle the radio. 2. Check modulation parameters. 3. Check all other settings. 4. Consult with factory
FP: I2C Error	There is an internal communications error.	1. Check for internal loose connectors. 2. Consult factory.
MOD: ASI OVERFLOW	External ASI Data Rate is set higher than the modulation will support.	1. Check ASI rate of the encoder and reduce below or equal to the Max Rate. See Section 5.2; under GOP settings. 2. Change the modulation parameters to support a high bit rate. See Section 5.2; under COFDM Parameters. **NOTE:** *Link reliability* ***will be reduced*** *as the data rate is increased.*
MOD: ASI UNLOCKED	External ASI Signal Lock Error.	1. Check external ASI cabling. 2. Check maximum cable length (< 200 Meters).
MOD: AUDIO ERROR	Problem with the Audio data.	1. Ensure there are no other Modulator or Encoder errors. 2. Ensure the audio input is properly selected. 3. Contact the factory.
MOD: Data Error	A setting is set to an illegal value.	1. Power cycle the radio. 2. Check modulation parameters. 3. Check all other settings. 4. Consult with factory
MOD: EMB RATE 1 or MOD: EMB RATE 2	Embedded Audio (1 or 2) data rate error.	1. Ensure audio parameters are set properly. 2. Ensure audio Embedding is enabled on source device. 3. Consult factory.
MOD: FPGA FAIL	FPGA failed software loading from PROM.	1. Power cycle the radio. 2. Consult with factory.
MOD: LOADING ERR	MOD microprocessor failed loading data EPROM, or EPROM data not recognizable.	1. Power cycle the radio. 2. Consult with factory.
MOD: I2C Error	Fault in the Modulator/Encoder Board.	Consult with factory.
MOD: NO AES AUDIO 1 or MOD: NO AES AUDIO 2	No AES Audio (1 or 2) signal.	1. Check AES cabling. 2. Check pin-out on cable.
MOD: NO EMD AUDIO 1 or MOD: NO EMD AUDIO 2	No embedded Audio (1 or 2) found in the SDI stream.	1. Check the audio input selection and ensure it is set to SDI. 2. Ensure Embedded Group is set to 1. 3. Ensure audio Embedding is enabled on source device.
MOD: NO VIDEO INPUT	Video signal missing.	1. Check for bad cable or connector. 2. Video standard.
MOD: VIDEO ERROR	Problem with video data.	1. Ensure there are no other Modulator or Encoder errors. 2. Ensure the video input is properly selected. 3. Contact the factory.

Table 18: NewsCaster VT2 Alarms

NewsCaster VT2 Alarms (*continued*)		
Alarm Message	**Problem**	**Probable Cause/Troubleshooting**
NO RF HEAD	The controller is not communicating with the RF Head.	1. Ensure that the Nycoil Cable is shorter than 200 feet and that the correct cable type is being used. 2. Check interconnect cables. 3. Disconnect cable from RF Head and measure the voltage between the center pin of the connector and the shield. The voltage should read 44 VDC - 48 VDC. a. If the voltage is not present, disconnect the cable from the control drawer and check the voltage between the center pin and the chassis for 44 VDC - 48 VDC. If present, the cabling is bad. 4. Disconnect the Antenna Polarization and P&T connector (*if installed*) and reboot the radio. If this resolves the problem: a. Check antenna type selection and ensure the proper setting: Nucomm or NSI. b. Check Polarization connector termination. c. If new installation, check pin-outs.
PSU: Voltage Error	PSU voltage regulation or amplitude level of +12 VDC beyond acceptable range.	1. Check input and output of PSU with Multimeter under load and without load. Will indicate if supply is bad or there is a loading problem. 2. Consult with factory.
RF: +5V Error or RF: +12V Error or RF: +12V Pwr Amp Err or RF: +24V Error or RF: +45V Error	RF Head Power Amp +12 VDC out of acceptable range.	1. Disconnect the Antenna Polarization and P&T connector (*if installed*) and reboot the radio. If this resolves the problem: a. Check the antenna type selection and ensure the proper setting: Nucomm or NSI. b. Check Polarization connector termination. c. If new installation, check cable pin-outs 2. Check Coax cable connectors. Refer to "NO RF HEAD" troubleshooting measures.
RF Head: I2C Error	The controller is not communicating with the RF Head.	1. Ensure that the Nycoil Cable is shorter than 200 feet and that the correct cable type is being used. 2. Check interconnect cables. 3. Disconnect cable from RF Head and measure the voltage between the center pin of the connector and the shield. The voltage should read 44 VDC - 48 VDC. a. If the voltage is not present, disconnect the cable from the control drawer and check the voltage between the center pin and the chassis for 44 VDC - 48 VDC. If present, the cabling is bad. 4. Disconnect the Antenna Polarization and P&T connector (*if installed*) and reboot the radio. If this resolves the problem: a. Check antenna type selection and ensure the proper setting: Nucomm or NSI. b. Check Polarization connector termination. c. If new installation, check pin-outs.

NewsCaster VT2 Alarms (*continued*)		
Alarm Message	**Problem**	**Probable Cause/Troubleshooting**
SYNTH: I2C Error	Internal problem in the UC.	Consult the factory.
UC: +5V Error or UC: +11V Error	Faulty UC PSU, voltage is out of tolerance.	1. Possible faulty main PSU. Ensure that there are no PSU faults by checking input and output with Multimeter. 2. Internal connector or cable problem. 3. Consult factory.
UC: I2C Error.	Internal problem in the UC.	Consult the factory.
UC: IFLO Unlock	IF Local Oscillator (Reference) cannot phase lock.	1. Ensure there are no other problems with the PSU's before continuing. 2. Change to a new channel, then return to the previous one. 3. Consult the factory.
UC: RFLO Unlock	RF Local Oscillator (Reference) cannot phase lock.	1. Ensure there are no other problems with the PSU's before continuing. 2. Change to a new channel, then return to the previous one. 3. Internal connector or cable problem. 4. Consult the factory.

5.5.1 Multiple Alarms

Under some situations, ***multiple alarms*** may occur. If this happens, correct any power supply voltage problem ***first***. In many instances, other alarms will be triggered as the result of a missing or out of range power supply level.

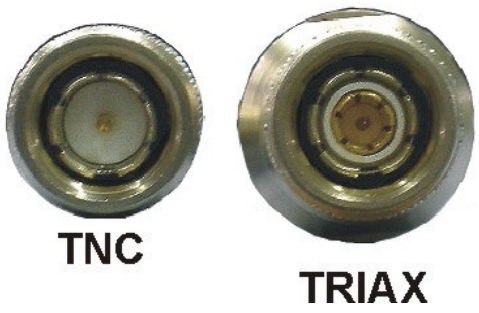
5.5.2 NCVT2 Control Unit Front Panel (*C132*)

When a problem occurs ***without an alarm prompt***, a good starting point is to check all of the setup menus. A parameter may have been inadvertently missed or set to the wrong value. If that doesn't solve the problem, then make a check of all internal cabling of the NCVT2 Control Unit, ensuing that all cables are properly seated and fastened tightly (*if applicable*). Also check to see if all jumpers (*if any*) have been installed properly. Finally, check all power supply voltages of the Control Unit, ensuring that they are within their specified limits.

WARNING!!!

To minimize the possibility of Electro-Static Discharge (*ESD*) damage, ensure that all equipment is properly grounded and that you are using ESD protective practices and equipment!

NOTE: *With **COAX / TNC** cables, the +45 VDC is on the center pin of the cable. For **TRIAX** cables, the +45 VDC is carried on the inner shield instead.*



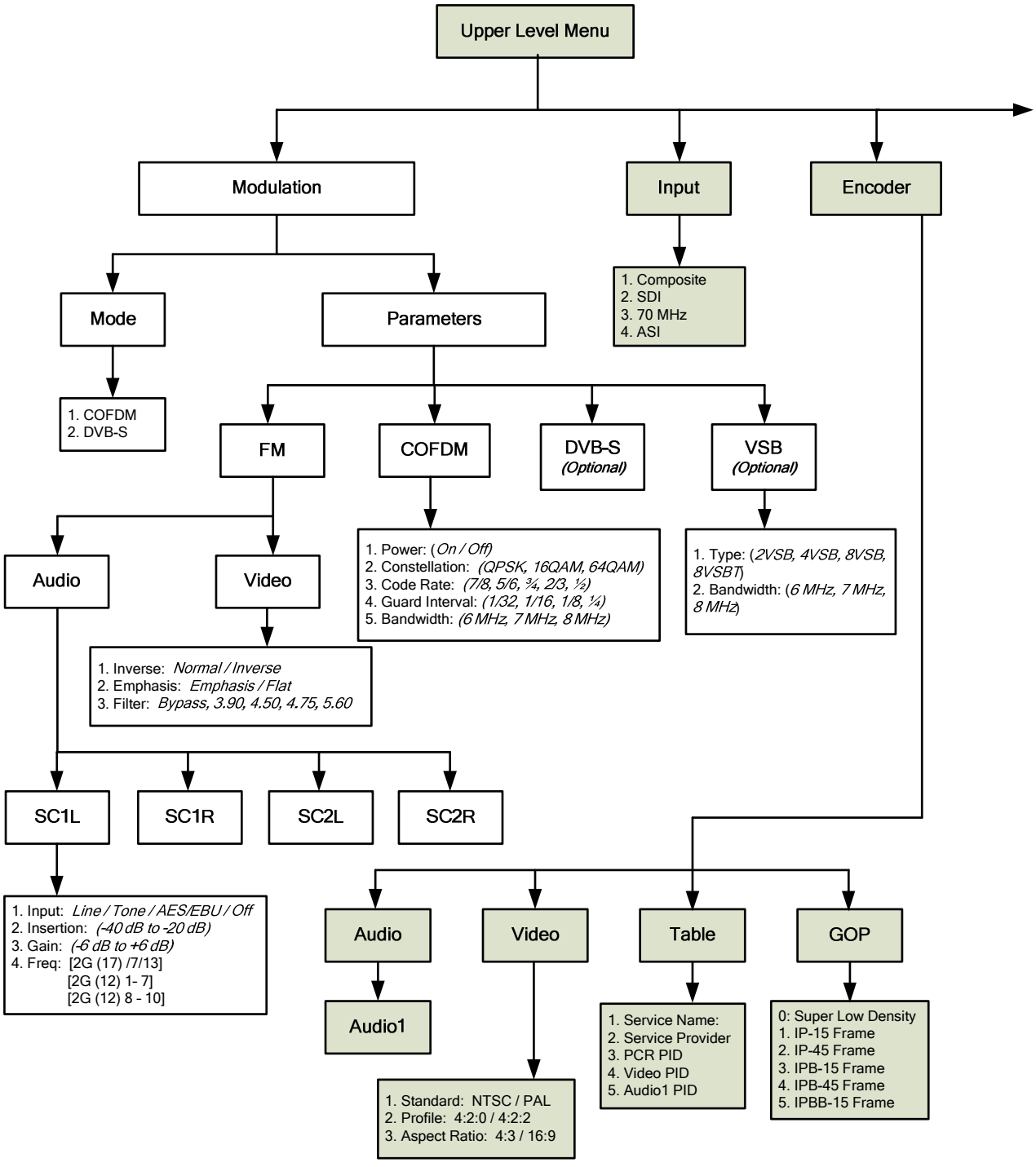


Figure 29: Menu Tree (*continued*)

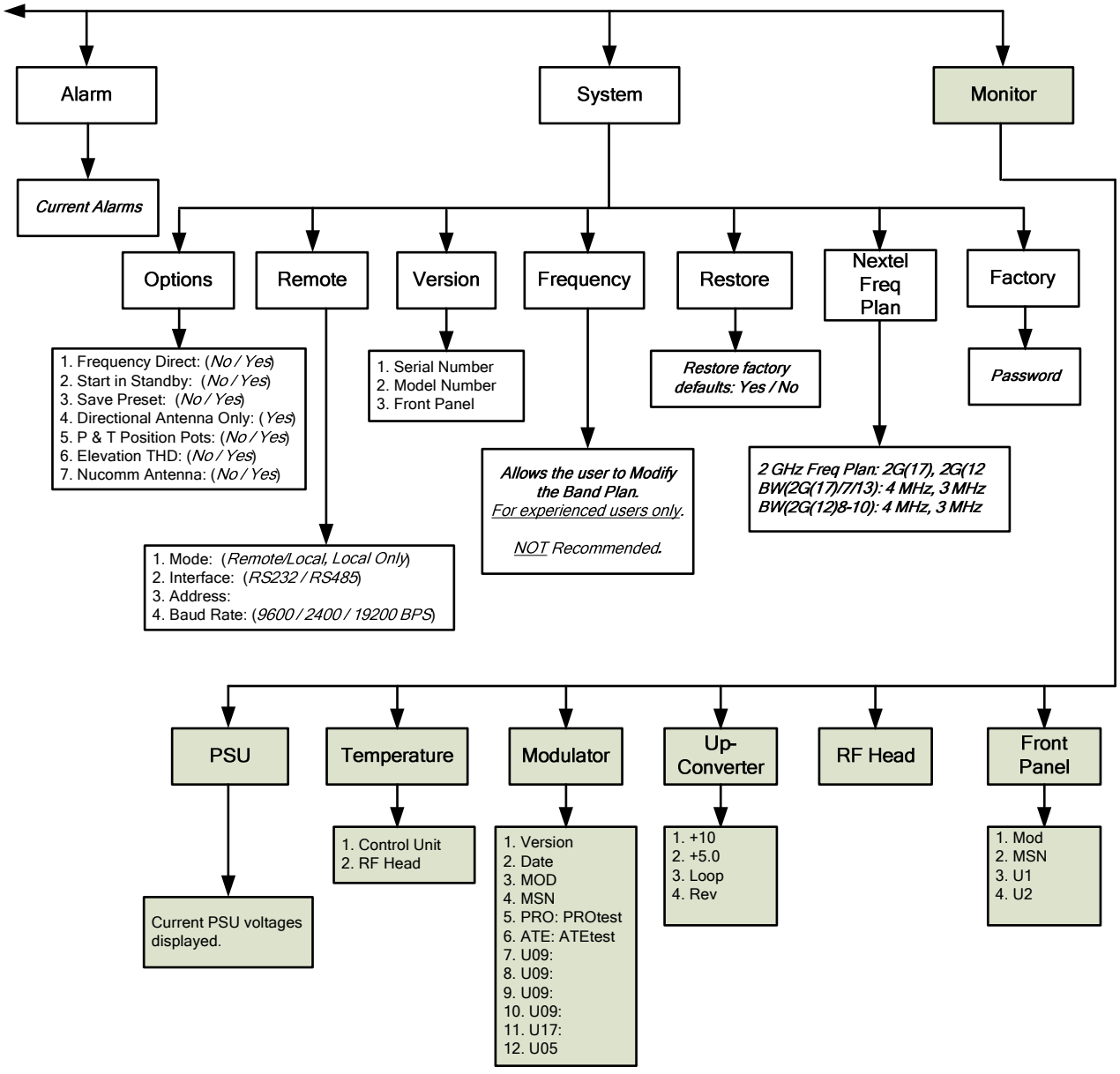


Figure 30: Menu Tree